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ABSTRACT

This report presents results of an investigation of possible reasons for the pronounced gender inequality in numbers of students served by special education in Wisconsin, especially in the categories of emotional disturbances (81 percent male), learning disabilities (71 percent male), and speech and language (66 percent male). The study found that these percentages have been fairly stable over time and are slightly above national averages. A review of the literature resulted in 11 hypotheses explaining these gender differences. These hypotheses are evaluated and grouped under five general factors: (1) biological differences; (2) learned differences; (3) different reactions of boys and girls to school; (4) different reactions of teachers to boys in comparison to girls; and (5) flaws or weaknesses in criteria, procedures, or tests. Recommendations include: develop a state policy on gender equity in special education and implement it as an element of compliance monitoring; provide inservice training to raise awareness of the law, the adverse effects of gender bias, and the need to avoid labeling children inappropriately; improve and strengthen classroom interventions prior to referral; improve the referral and evaluation team processes; and improve the quality of special education programs so that teachers are not reluctant to refer girls. (Contains 86 references.) (DB)

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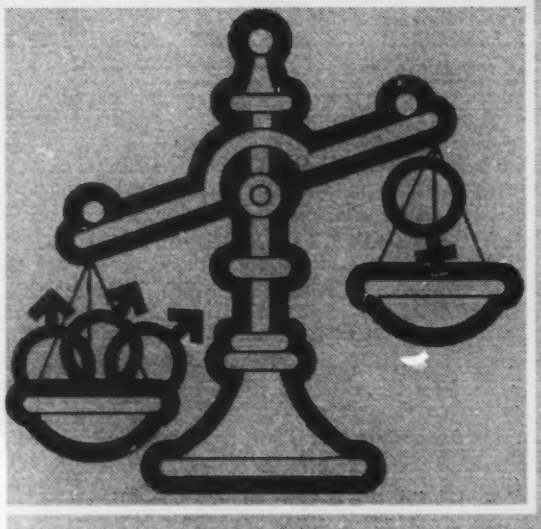

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Gender Disparities in Special Education

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Executive Summary

In June 1990, State Senator Barbara Ulichny requested empirical information and hypotheses to explain why there are so many more males than females enrolled in Wisconsin's special education programs. Title IX of the federal Education Amendments together with the Individuals with Disabilities Education Act (IDEA) protect students from gender discrimination in special education.

Three areas of disability include more boys than girls. In Wisconsin, 81 percent of those students whose primary disability is emotional disturbance (ED) are males. The male percentage in learning disabilities (LD) is 71 percent and that in speech and language (SL) is 66 percent. The other disability areas have more balanced male and female percentages. These percentages have been fairly stable in Wisconsin over the years. Wisconsin's male percentages are slightly above the national averages in all three areas. The report focuses on the gender disparities in ED and LD.

Eleven hypotheses explaining these gender disparities emerge from a preliminary review of the literature and staff suggestions. They are grouped under five general factors:

- biological differences
- learned differences
- different reactions of boys and girls to school
- different reactions of teachers to boys in comparison to girls, and
- flaws or weaknesses in criteria, procedures, or tests.

Biological Differences

Scientist have recognized and continue to investigate the biological differences between males and females. Although it is difficult to connect biological causes to gender disparities in special education, some important facts are known. Among them, females have certain biological advantages such as fewer birth defects and more rapid physical maturation rates.

One well accepted explanation for certain advantages of females lies in the 23rd pair of human chromosomes, which determine the gender of a fetus. They are XX in females and XY in males. If a gene on one of a female's X chromosomes is disabled, a healthy gene on the other X can counter its effects. Males, with XY, are prone to X-linked disabilities such as hemophilia and certain forms of mental retardation. However, the male's XY chromosomes do not seem to be associated with either ED or LD.

Other biological factors, including antigens, neurochemicals, and hormones, may someday explain the advantages of females in ED and LD but, these factors require further study. While biological factors may account for part of the gender disparities in the enrollments of ED (80 percent male, 20 percent female) and LD (70 percent male, 30 percent female), it is likely that early learning experiences play as great a role.

Learned Differences

People tend to acquire their conventional gender roles primarily by imitating same-sex parents, older siblings, and peers, especially if they perceive the model's behavior as successful and in line with prevailing mores. Sex-appropriate behavior is often expected, taught, and rewarded, while inappropriate behaviors are often discouraged within the family unit. Because women generally provide primary child care and elementary level teaching, young girls have more exposure and access to same-sex role models than do young boys. And if divorce fragments the family, boys receive even less access to male role models. Family problems appear to be more stressful for boys than for girls, possibly because of immaturity.

Different Reactions of Boys and Girls to School

One well-integrated theory proposes that acquired differences in male and female behavior lead to over-referral of males and under-referral of girls in both ED and LD. It is asserted that the conventional male gender roles of independence, activity, and aggression are in direct conflict with the typical elementary school's demand for obedience and compliance. As a result, boys have two real options, to accept or reject the authority of the teacher. Boys' responses are often disruptive or non-participatory, and may result in an ED or LD assessment referral, respectively, although many of these boys may have no exceptional educational needs.

Girls' conventional gender roles of dependence, passivity, and compliance fit school expectations at the elementary level and educators may overlook some of their emotional or learning problems. Girls are referred somewhat more often for ED during their teens, perhaps because the conventional female gender role fits less well at the secondary level.

Different Reactions of Teachers to Boys in Comparison to Girls

Considerable research exists on differences in teachers' referral rates for boys and girls. A number of studies asked educators to make referral decisions based on fictitious case histories of students with problems, where gender and other factors were varied systematically. In the fictitious context, some studies found a gender disparity, others did not. In real classrooms, however, boys are referred much more often than girls.

Some authors suggest that certain teacher characteristics influence decisions to refer students for assessment. For example, a teacher with a low tolerance for misbehavior may make a large number of referrals. Studies of teacher gender and the likelihood of referral yielded mixed results. There was some evidence that the more similarities between teacher and student, such as gender and race, the less likely is a referral.

Some over-protective teachers may be reluctant to refer girls for special education evaluation. They may perceive girls as being less able to bear the stigma that often accompanies special education labels. Further, some teachers have doubts about the appropriateness or adequacy of special education programs to meet girls' needs.

Bureau for Exceptional Children staff studied the 50 states' prevalence rates and male percentages in ED, LD, and SL. Prevalence rates are the percentage of the entire population of students who are enrolled in ED, LD, or SL. Results included the following:

- States' male percentages in ED, LD, and SL correlate negatively with their corresponding prevalence rates. In other words, states with higher prevalence rates tend to enroll more balanced numbers of males and females.
- Certain state demographic characteristics like population density and income are related to prevalence rates.
- Compared with other states, and taking demographic characteristics into account, Wisconsin's prevalence rates (except in ED) are a bit low and its male percentages roughly in line with other states.

It is possible that states' social and economic conditions influence the proportions of students they identify and serve. This, in turn, influences the states' proportions of males and females enrolled. If similar factors drive the prevalence rates of school districts, the teachers in poorer districts may be constrained to refer only their most "severe" cases, often the disruptive or low-achieving males.

Flaws or Weaknesses in Criteria, Procedures, and Tests

Definitions of disabilities (ED in particular) vary from state to state. Actual applications of formal definitions may vary among the districts within a state and also among teachers within a district. Variation also exists among districts regarding the objective test instruments and the criteria or cut-off points which M-teams use to determine eligibility. As a result, a student found eligible for ED or LD in one state or district might not be identified in the next.

Investigators found that some M-team members pay more attention to the comments of the referring teacher than they do to objective test results and that M-team procedures do not focus on evidence. M-teams may adopt a "better safe than sorry" attitude, if they feel pressure to make positive identifications.

Recommendations

Senator Ulichny also asked for recommendations aimed at resolving the gender disparities that exist. The review of literature netted a number of suggestions:

- Develop a state policy on gender equity in special education and implement it as an element of compliance monitoring.
- Provide inservice training to raise awareness of the law, to understand the adverse effects of gender bias, to avoid labeling children inappropriately, and to demystify emotional disturbance.
- Improve and strengthen classroom interventions prior to or instead of referral.
- Improve the referral and M-team processes.
- Improve the quality of special education programs so that teachers are not reluctant to refer girls.

Further Research

The recommendations offered in the report focus on assessing and countering errors of identification in ED and LD. Reduction of such errors is not only a desirable outcome in itself, but should lead directly to a closer gender balance. Suggested directions for further research include the following:

- Assess the relative influence of certain district and teacher characteristics on identification error.
- Identify and explore the specific problems in ED and LD that occur more often with females than with males.
- Assess the strengths and weaknesses of ED and LD identification tests.
- Assess the strengths and weaknesses of the M-team process.
- Assess the costs and the benefits of various solutions to the problem of identification error by means of field tests.

For more information please contact the Wisconsin Department of Public Instruction, Bureau of Exceptional Children, (608) 266-1781.

Introduction

There are considerably more males than females being served in Wisconsin's special education programs. This is especially true in the areas of emotional disturbance (ED), learning disabilities (LD), and speech and language (SL). Most of the other disability areas are more evenly balanced between males and females. The following Wisconsin male percentages are three-year averages: deaf (52 percent males), deaf-blind (52 percent), hearing impairments (53 percent), cognitive disabilities-mild or borderline (54 percent), orthopedic impairments (54 percent), and cognitive disabilities-moderate or severe (57 percent males). Another area, other health impairments, has a somewhat elevated male percentage (63 percent).

By contrast, Wisconsin's percentages of males in the three disability areas at issue here are emotional disturbance (81 percent), learning disabilities (71 percent), and speech and language (66 percent). These male percentages have stayed at about the same levels for some years in Wisconsin.

Wisconsin's percentages of males are not markedly different from those of other states, although they are on the high side in all three areas. The most recent Office of Civil Rights data, based on representative samples of schools, are for 1984. In that year, the 50 states' mean male percentages and those for Wisconsin were as follows: emotionally disturbed (78.3 percent nationally versus 79.6 percent for Wisconsin), learning disabilities (70.6 percent versus 73.1 percent), and speech and language (63.1 percent versus 64.1 percent).

In June, 1990, State Senator Barbara Ulichny wrote to State Superintendent of Public Instruction, Herbert J. Grover, requesting that the Department of Public Instruction (DPI) provide empirical information and hypotheses to explain why these disparities were occurring. She also asked the DPI to take appropriate steps to correct any inequities.

State Superintendent Grover asked his Advisory Council on Exceptional Education to aid DPI staff in a review and analysis of the causes of male over-representation in special education. The council subsequently asked the DPI's Bureau for Exceptional Children to provide additional research materials regarding the reasons for these disparities. The council reviewed draft materials related to this project as they became available and provided comments and questions at various stages.

An ad hoc committee was formed within the Bureau to plan and carry out the research tasks associated with this request. The committee (Lynn Boreson, Jim Despins, Jill Haglund, Judd Harmon, Barbara Leadholm, Donita O'Donnell, Stephanie Petska, and Tom Stockton) met on a regular basis to guide the research process and assess findings.

After a preliminary review of the literature, the committee generated a rather extensive list of plausible hypotheses to explain the observed gender disparities. They appear in Section One of the present report. Section Two is a more thorough review of the literature, although it focused on ED and LD. Bureau staff carried out two studies using available data. They appear in this report as Sections Three and Four.

Senator Ulichny requested empirical information and hypotheses to explain the observed gender disparities in special education. Of the two, hypotheses are much easier to obtain. For example, those presented in Section One of this report only required a few days, while each of the studies the DPI carried out, using available data, required several weeks.

But hypotheses without empirical evidence are empty. In order to know which hypotheses or explanations are valid and may be used when considering subsequent interventions or changes in policy and practice, one must know the evidence upon which they are based.

This report sets out a number of plausible hypotheses, presents empirical information about them, and examines them in the light of that information. Procedures are also described since the ways in which evidence is gathered often influence what evidence is obtained. Investigators gather information where they can, on as much of the issue as they can manage, using procedures they believe to be appropriate, and with the resources available to them. Such a project has problems because, as Blalock (1984) notes, the issues are very complex and investigators in these areas have diverse interests, backgrounds, and procedures.

The result is not a clear photograph, but an incomplete montage in which some patterns emerge because of similar findings. Parts of the montage are unclear since the results of different investigators are in conflict. Further, there are some empty spots where little or no information exists or where the limited literature search did not reveal it.

One would like to determine which of a number of possible causal factors do, in fact, have an influence on the observed gender disparities and to understand the mechanisms underlying the causal relationships that are found. It would also help to know which are the major causal factors and which only come into play in certain situations. Finally, it would help to know which causal factors apply to both ED and LD and which are unique to an individual disability area.

The DPI would like to know what causal or enabling factors, if changed, will bring about beneficial results. Senator Ulichny ended her request by stressing the importance of considering "methods to correct this situation."

Indeed, gender disparities could be seen as evidence of violations of anti-discrimination laws. But how can one tell when the situation has been "corrected?" Will it have been corrected when the male percentages in ED and LD are reduced to that of orthopedic impairments (54 percent), for example? Rather than target a particular level of male percentages, in the final section of this report steps are suggested to reduce errors of identification and referral as a means for reducing gender disparity.

Research findings of associations, correlations, and relationships, as were obtained in most prior studies, are not a sufficient basis for making changes in policies or procedures. For one thing, they do not explain exactly which causal factors to manipulate. For another thing, making a change in one causal factor may not only influence the outcome (such as reducing identification errors and gender disparity), but may also influence other factors, and not necessarily in a desirable way. In order to know for sure what factors to change or manipulate, some field tests must be run in which the assumed causal factors are manipulated and the consequences are assessed.

Ethics in social engineering require that responsible people do not intervene and manipulate causal factors without knowing the costs and benefits involved ahead of time. One must find out what human, material, and dollar resources will be needed, and if there will be any undesirable side-effects of the changes that are introduced.

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Blalock, Hubert M., Jr. *Basic Dilemmas in the Social Sciences.* Beverly Hill, CA: Sage Publications, 1984.

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Hypotheses Regarding Causes of the Gender Disparity

The following hypotheses were generated on the basis of a preliminary search of the literature and discussions with professional colleagues. Descriptions of the presumed mechanisms underlying each hypothesis are listed here although members of the Bureau ad hoc planning and guidance committee discounted some of them as being implausible.

It should be kept in mind that these are hypotheses to be examined and not statements of known fact.

- There are real differences between males and females in emotional disturbance (ED) and learning disabilities (LD). These differences are due to unlearned factors, such as genetic or other physical conditions, to maturation differences, or to learned factors such as sex role modeling. Current procedures used to identify students with exceptional educational needs (EENs) are reasonably valid and accurate and are used appropriately by school personnel.

- Girls behave more passively than boys, are less disruptive in classrooms, and are less often identified as potentially having EENs in ED or LD, although they may, in fact, be as likely as boys to have EENs in those areas.

- Boys, more than girls, find the school environment, its female teachers, and its demands upon them to be uninteresting, inappropriate, constricting, and unrewarding. Thus, school itself is stressful for many boys. They respond by acting out more than girls. As a result, teachers notice and refer them for evaluation more often than girls, although many of the boys who are referred do not, in fact, have any EENs.

- There is an interaction between teacher gender and student gender. Female teachers tend to notice and be alarmed more by boys' behaviors which suggest problems in ED or LD than by the behavior of girls, while male teachers are no more alarmed by boys' behavior than by girls' behavior.

- Boys exhibit behavior that suggests ED or LD problems when female teachers are present but not when male teachers are present. Girls do not act differently toward male and female teachers.

- Teachers, by certain actions, tend to elicit maladaptive behavior from boys but not from girls.

- High-referral teachers make the majority of referrals for ED or LD and perhaps for other EEN areas as well. For whatever reasons, they tend to refer more boys than girls for ED and LD. By contrast, low-referral teachers refer equal numbers of boys and girls.

- There are flaws or weaknesses in the ED and LD identification criteria or procedures.

— The constructs (that is, a student's personality or behavior characteristics) central to the criteria for identification are based on conceptions of normal, appropriate male behavior. They include some constructs which are less relevant to females, such as aggression or reading problems, and omit others which are more relevant to females, such as withdrawal or problems in mathematics.

— The criterion cut-points were established on what is commonly accepted as abnormal or maladaptive male behavior. When these cut-points are applied to females, only those with more severe needs exceed the cut-points.

— The central constructs are subtle and multiple. This subtlety allows room for personal, subjective factors to affect the decision to refer or not refer and increases the chanc-

es of referring students who do not have EENs and not referring students who do have EENs. These are false positives and false negatives, respectively. It is predicted that most false positives are boys and most false negatives are girls.

— While most children with physical impairments and mental retardation are identified and referred by medical professionals, most students with suspected EENs in ED and LD are identified and referred by teachers. Few teachers are well trained in the process and knowledge of the criteria to be used. This results in identification and referral errors. However, these errors are markedly reduced with appropriate training.

— The tests which are used for determining eligibility in these areas are inadequate. (This sub-hypothesis was added to the original list.)

• Adults who make special education referrals notice manifestations of EENs in girls as often and as accurately as they do in boys, but are more likely to refer boys than to refer girls for one or more of the following reasons:

— They believe the social, academic, and career goals of special education are more appropriate for boys than for girls, because they believe that girls with EENs do not have futures that require professional skills. However, they believe boys' professional development is crucial, and thus see referral as necessary.

— They feel that it might be dangerous to refer girls to a special education program which is made up mostly of disruptive boys. Thus, they over-protect girls who have borderline EENs.

— They feel that it would be a disservice to label girls as having ED or LD problems because they believe girls are less able to endure the social stigma of special education. (This sub-hypothesis was added to the original list.)

— They feel that they, themselves, and the other students would benefit by the absence of disruptive boys with potential EENs, but not by the absence of passive girls with potential EENs.

— They are able to cope with the female candidates for referral (and have been able to cope with similar females in the past), but they have run out of ideas and energy for coping with the males.

— There is administration or board pressure not to increase the numbers of children in EEN programs, so they refer only the more "severe" cases, which include many more boys than girls.

Implicit in the first three reasons are presumed teacher perceptions of the needs and welfare of children, but the final three reasons imply the influence of teacher and institutional needs and welfare.

• Procedures for identification are satisfactory and result in roughly equal numbers of males and females with suspected EENs in ED and LD being referred for M-team evaluations. However, the total numbers of boys enrolled in these programs are greater than the numbers of girls because:

— Girls' parents are more likely to refuse the referral or an M-team's finding of EENs than are boys' parents.

— M-teams are more likely to determine that girls have no EEN than they are to determine that boys have no EEN.

— Girls' parents are more likely to remove their child from ED or LD programs than are boy's parents.

— Girls in ED and LD programs improve at a higher rate than boys do and girls return from special education to regular education more often and earlier than boys do.

— Regular education teachers resist having certain boys return from special education programs to the regular classroom.

• The high percentages of males in Wisconsin's ED, LD, and SL programs are due to certain events or conditions which are, to some degree, different in Wisconsin from those in other states.

A Review of the Literature

Introduction

While there are variations among states, nationally males comprise about 80 percent of the students in special education programs whose primary disability is emotional disturbance (ED). Males make up about 70 percent of the students in learning disabilities (LD) and about 60 percent in speech and language (SL). Females constitute about 20 percent, 30 percent, and 40 percent of these disability groups, respectively. This review of the literature examines and investigates the causes of these disparities between males and females, particularly in ED and LD.

Because evidence or theory was found for a number of different causes, all viewpoints are represented here as faithfully as possible.

Previous reviews of the literature by Bee (in press), Fine and Asch (1981), Gillespie and Fink (1974), Hathaway and Corbett (1981), Hollingsworth and Mastroberti (1983), Kedar-Voivodas (1983), Knitzer, Steinberg, and Fleish (1990), Kratovil and Bailey (1986), the National Information Center for Children and Youth with Handicaps (1990), Richardson and others (1986), Rossi (1972), and Vogel (1990) focus highly on certain issues or factors. This review is more wide ranging, since it

- presents works focused on laws dealing with disabled persons and gender equity or on the social and personal consequences of inequitable treatment of women.
- presents demographic reports on the "research-identified" incidence of various conditions.
- reports the rates of school referrals of children for various special education services.
- covers biological factors that are believed to be inherently different for boys and girls, plus early learning factors and differential reactions to school.
- deals with a variety of teacher factors, such as teacher gender and the interaction between teacher gender and student gender.
- addresses weaknesses in the criteria, instruments, and procedures used in identifying and referring students as well as the multi-disciplinary (M-team) process.
- presents miscellaneous causal factors, such as: school and community characteristics, teachers' perceptions of program appropriateness for females, and teachers' reluctance to label girls as ED or LD.
- presents some solutions to the male-female disparity and to related problems, as offered by authors whose works were reviewed.

Legal and Personal Aspects of Disability and Gender Equity

Hathaway and Corbett (1981) provided clear, concise descriptions of P.L. 94-142, Title IX of the Education Amendments, and Section 504 of the 1973 Rehabilitation Act. They discussed the implications of those laws for disabled women and for girls in school.

They noted that Public Law 94-142, the Education for All Handicapped Children Act, passed in 1975, (now Individuals with Disabilities Education Act, IDEA) assures free and appropriate public education, emphasizing integration of all disabled children with non-disabled children. Title IX mandates the elimination of various forms of sex discrimination

in educational programs and activities of agencies receiving federal funds. They point out that there is nothing in Title IX that prohibits it from covering disabled students.

Kratovil and Bailey (1986) reviewed prior literature which suggested that the needs and rights of disabled boys and girls, under Title IX, Section 504, and P.L. 94-142, were being met unsatisfactorily. No child should enter (or, presumably, be kept from entering) special education programs inappropriately.

Fine and Asch (1981) noted that economic, social, and psychological constraints place disabled women at a distinct disadvantage, relative to disabled men and to non-disabled women, regarding training, employment, and earnings.

Hollingsworth and Mastroberti (1983) reviewed prior works dealing generally with women's career development, aspirations and interests, career choices, and achievement motivation. They devote a final section to disabled women. While society assumes that, for men, life is unfulfilled without productive work, no such assumption is made for women. As a result, the less-educated disabled woman, with severe limitations, and perhaps with several children, faces many barriers to earning a decent living.

Both Fine and Asch (1981) and Hollingsworth and Mastroberti (1983) used the general term, disability, and did not refer to ED or LD impairments. However, their comments about society's lack of concern for disabled females may apply to those areas as well.

The National Information Center for Children and Youth with Handicaps (1990) noted that schools reflect societal views. For example, there are many remedial reading programs which are filled with boys who often have reading problems. However, girls often have problems in math, but there are very few remedial math programs for them.

Demographics of Incidence

Bee (in press) presented the following table which shows disparate proportions of males and females in several areas. The area with the greatest male to female ratio (5:1) is that of conduct disorders, including delinquency. Goldstein and Glick (1987) reported that the male to female ratio in juvenile delinquency was 4:1 and that females have begun to close the gap in recent years. Note the single area, anxiety and depression during adolescence (starred), in which there were more females than males. This finding was substantiated in the study reported in Section Four.

Type of Problem	Approximate Ratio of Males to Females
Psychopathologies:	
Attention Deficit Hyperactivity Disorder	2:1
Conduct disorders including delinquency	5:1
Anxiety and depression: preadolescence	1:1
Anxiety and depression: adolescence	1:2 *
Estimated number of all children with all diagnoses seen in psychiatric clinics	2:1
Intellectual atypical development:	
Mental Retardation	3:2
Learning Disabilities	3:2
Physical Problems:	
Blindness or significant visual problems	1:1
Hearing Impairment	5:4
Autism	3:1

Sources: Achenbach, 1982; Anthony, 1980; Eme, 1979, Rutter & Garmezy, 1983; Rutter, 1989 (in Bee, in press).

Three studies reported finding equal or more nearly equal proportions of males and females in the area of learning disabilities. All are described more fully in the subsections on learning disabilities, below. Gross (1978) reported that there were equal numbers of girls and boys in Israel learning disability programs, in contrast to the male-dominated programs in the United States. Emery (1973), in a screening of 300 students, found equal proportions of boys and girls with learning related problems. Naiden (1976), examining reading achievement test scores among Seattle's elementary students, found equal proportions of girls and boys achieving two or more years below their grade level.

Two recent reports provide information on disabilities (LaPlante, 1988) and on children's health (Zill and Schoenborn, 1990), based on large scale, national samples of households.

LaPlante's teams interviewed a random sample of U.S. families with regard to 70 different disabilities and limitations. Those reported conditions which showed noticeable differences between males and females of age 18 and younger were as follows: Females, more than males, had curvature of the back or spine and impairment of the lower extremities. Males, more than females, had speech impairments, neuroses or personality disorders, and mental retardation. The prevalence of learning disabilities was not part of the assessment.

Zill and Schoenborn's interviewers conducted face-to-face interviews. Although it was a national sample, cost limitations did not permit sampling in all states (Schoenborn, 1991). Respondents were informed adults, usually the child's mother. A sample of 17,110 children was obtained by means of random selection of one child per family in any family with a child of age 17 or younger.

Of interest were the percentages of children, ages 3-17, who "had ever (sic) had an emotional or behavioral problem that lasted three months or more or required psychological help" and of those who "had ever (sic) had a learning disability." These rather inclusive definitions yielded larger percentages than the ED and LD prevalence rates reported by state programs for special education primarily because the states' rates reflect prevalence in a given year and are not cumulative over a child's life.

Zill and Schoenborn found that, as with most health problems, the older the child the more likely was a report of having ever had emotional problems (5.3 percent of children ages 3-5, 12.7 percent of children ages 6-11, and 18.5 percent of children ages 12-17).

The ED male to female ratios for the three age categories are enlightening. For age 3-5 the male to female ratio was about 1.4:1. For ages 6-11 the male to female ratio was 1.6:1. The females gained some ground at ages 12-17, where the ratio was about 1.2:1. It appears that girls, more than boys, are experiencing problems during the teen years. The same finding was reported by Bee (see above) and was supported in the study of Wisconsin male percentages by age level (See Section Four). Across all ages, including adults, the male prevalence reported by Zill and Schoenborn was 15.4 percent and the female prevalence was 11.3 percent, a ratio of 1.4:1.

Zill and Schoenborn found several other factors which were related to the prevalence of emotional problems. They are worth noting here because gender is not the only factor related to prevalence. White children (14.2 percent) were reported by their families more than black (10.3 percent). Poorer children (16 percent) were reported more than wealthy (13 percent). Children in non-traditional families were reported more often (about 20 percent) than those living with both their biological fathers and mothers (8 percent). The family structure with the greatest emotional disturbance rate across all ages was biological mother and stepfather (23.6 percent). Children whose general health status was fair or poor were reported as having emotional problems more often (23 percent) than those whose health was excellent or very good (13 percent).

Regarding learning disabilities, the general prevalence rate (6.5 percent) was considerably lower than that for emotional problems (about 13 percent) and was closer to the prevalence rates reported by states' special education programs. Incidently, children who

were reported by their families as learning disabled had probably been identified first by their schools. As a result, one cannot assume that these cases are truly "research identified."

Again, older children were more likely to be reported by parents as having ever had learning disabilities. At succeeding age levels the percentages of males become increasingly greater and greater than the percentages of females (1.7 percent for males versus 1.6 percent for females at ages 3-5, 8.4 percent versus 5.1 percent at ages 6-11, and 12.1 percent versus 5.2 percent at ages 12-17). This finding was substantiated in the study reported in Section Four. Across all ages, the male rate was 8.6 percent and the female rate was 4.4 percent, a male to female ratio of about 2:1. This is slightly higher than the ratio of 3:2 reported by Bee.

Zill and Schoenborn found relatively small differences between the learning disabilities prevalence rates of white and black children (white 6.7 percent, black 6.2 percent). Differences among four family income categories were noticeable. Rates were 8.4 percent, 7.2 percent, 6.2 percent, and 5.8 percent for low to high income families, respectively. Learning disability prevalence rates varied by family structure and the child's general health status about the same as was seen for emotional and behavioral problems. Again, the family structure with the highest over-all reported rate (9.1 percent) was biological mother and stepfather.

Rates of Referral in Schools

Knitzer, Steinberg, and Fleisch (1990) believed that too few behaviorally and emotionally disturbed and disordered (BED) children are being identified by the schools (about 1 percent of the population) compared to the 3-5 percent who are estimated to have very serious BED disabilities.

While the national surveys of LaPlante (1988) and Zill and Schoenborn (1990) found family-reported ratios of males to females to be about 1.4:1 in emotional problems and while Zill and Schoenborn found the male to female ratio in learning disabilities to be about 2:1, the following seven works reported considerably higher male to female ratios for actual referrals of students for behavior or academic problems. In order to provide a better picture of the context in which male and female referrals occur, some general findings about school referral are also described.

Harris et al. (1987) sent surveys to a national sample of school psychologists requesting information on their two most recent referrals. Of all students referred, 70 percent were males and 30 percent females. The main reasons for referral were academic performance (52 percent) and behavioral excesses or deficits (31 percent). Most of the referred students were in the primary grades (29 percent of the total), compared to students at other levels: intermediate (17 percent), upper elementary (13 percent), junior high (14 percent), and high school (15 per ent of all students referred). Most students (57 percent) were referred by a teacher, 15 percent were referred by parents, 8 percent by other pupil personnel workers than the school psychologist (the respondent), 4 percent by administrators, and the rest by others. Self-referrals made up 2 percent of the total.

The ratio of males to females was 3:1 or 4:1 in most elementary grades and even higher at the junior high level, but the ratio was close to 1:1 in senior high school (which agrees with the findings of the study reported in Section Four as well as the findings of Bee and of Zill and Schoenborn, above). Only 9 percent of all males were referred because of deficits (anxiety, withdrawal, fear), compared to 21 percent of the referred females.

Lietz and Gregory (1978) examined school records of students in a naturally integrated (that is, not bused) public elementary school who had been referred to the office during the 1975-76 school year, either for deportment or for suspected exceptional educational needs. Comparisons were made on the basis of pupil race and sex.

Across black and white students, 29 percent of all the school's girls and 47 percent of all boys were sent to the office one or more times during the year. Among those students who were referred, the mean number of office referrals per girl (2.0) was less than that per boy (5.9). The more disruptive reasons for referral (throwing objects, disobedience, fighting, assault, threatening, and profanity) were significantly more characteristic of males than of females.

For both the numbers of office referrals and the reasons for referral, differences between males and females were much greater than differences between black and white students.

Tomlinson et al. (1977) studied referrals for psychological services. They also made comparisons between races (white and minority) and sexes, but included referrals for students at all school levels and studied a larger number of schools. Out of the district's 61 schools with a minority enrollment of 10 percent or more, a sample was drawn which included 18 elementary, 6 junior high, and 3 senior high schools (whose total enrollments numbered 17,137 students). All of the 355 students who were referred for psychological services in these schools within an eight month time period were included in the study.

Males made up 68 percent of the referrals and females 32 percent (a male to female ratio of 2:1). There were no differences in the percentages of the referred males and females regarding presenting problem, psychologist's contacts with referring teachers, recommended special education services, or issues covered in subsequent contacts with parents. However psychologists were significantly more likely to contact parents of females (35 percent) than parents of males (24 percent).

With regard to race, a greater percentage of the minority population (2.9 percent of the total) was referred than of the white population (1.6 percent). They noted, however, that the schools with the lowest minority referral rates were those that had been integrated the longest. This finding suggested to them that racial biases may decrease with contact and experience over time.

McIntyre (1988) contacted 92 elementary teachers in Jackson County, Oregon, of whom 60 had referred one or more students during the year for special education services and 32 had not. Those who had made referrals completed the Child Behavior Checklist (which assesses the seriousness of behavioral and academic problems) on a referred student. Of the 60 students who were referred, 53 (88 percent) were males and 7 (12 percent) were females, a male to female ratio of 7.6:1.

Naiden (1976) noted the discrepancy between the male to female ratio in Seattle's learning disabilities programs (about 4:1) and the male to female ratio in a voluntary, adult remedial reading program (1:1). The difference prompted her to study the schools' referrals.

She examined the district's Metropolitan Achievement Test reading scores for 4th, 6th, and 8th graders, determined the scores which corresponded to reading achievement two years below grade level, and counted the numbers of boys and girls at each of the three grades who were below grade level. Instead of 80 percent boys, as was found in learning disability programs, about 62 percent of the test-identified low readers at grade four were boys, about 58 percent at grade six, and about 59 percent at grade eight. Across all three grades, the test-identified low reading male to female ratio was about 3:2 and not 4:1, as identified by the schools.

Shaywitz et al. (1990) made use of data collected in the Connecticut Longitudinal Study which followed a cohort of students from 24 sampled kindergarten classes for a number of years, starting in the 1983-84 school year.

Data on ability (the Wechsler Intelligence Scale for Children - R Verbal, Performance, and Full-Scale IQ) and on reading and mathematics achievement (Woodcock-Johnson Psycho-Educational Battery, Part II) were gathered for 235 girls and 210 boys in kindergarten in 1983-84. In addition, the classroom performance of these students was assessed by means of the Multigrade Inventory for Teachers (MIT), which included six scales: Attention, Activity, Language, Dexterity, Behavior, and Academics.

At the end of their second and third grade years, information was obtained as to which students had been school-identified as reading disabled (RD) and were receiving special education services for that disability.

For each student, Shaywitz and her colleagues generated a predicted reading achievement level by means of a regression model based on WISC IQ scores obtained earlier. Research-identified RD students were defined as those scoring 1.5 standard deviations or more below their predicted reading achievement level.

By the second grade, 8.7 percent of the boys and 6.9 percent of the girls (a non-significant difference) were research-identified as RD, while the school-identified prevalence rates were 13.6 percent of the boys and only 3.2 percent of the girls (a significant difference). By grade three, the research-identified RD prevalence rates were 9.0 percent of the boys and 6.0 percent of the girls (non-significant) and the school-identified rates were 10.0 percent of the boys and 4.2 percent of the girls (significant).

No significant gender differences were seen in WISC IQ or Woodcock-Johnson reading and mathematics achievement. However, boys received significantly poorer ratings from their teachers than girls did on each of the six MIT scales of classroom performance.

The research-identified RD students, compared to students research-identified as non-RD, had more problems in attention, dexterity, language, and academics, but were no different in activity level or behavior. In contrast, the school-identified RD students differed from the school-identified non-RD students by having more activity and behavior problems, which are among the characteristics that differentiated normal boys from normal girls in the Connecticut Longitudinal Study population.

Finally, Wagner (1976) carried out a study which revealed some differences between teacher referrals and student self-referrals. She described group counseling to seven fourth grade teachers and their 157 students. Students were then asked to indicate their willingness to participate in an initial counseling interview. Teachers were also asked to complete referrals sheets, but without knowledge of their students' decisions.

The school with the most obvious problems (poverty, prevalence of aggressive behavior, etc.) had the highest rates of self-referrals and teacher referrals. Five of the seven teachers referred more boys than girls. One of these referred 91 percent of the boys in the class and 33 percent of the girls. Another referred 69 percent of the boys and 40 percent of the girls. Another referred 44 percent of the boys and 0 percent of the girls.

Almost half of the boys (48 percent) were teacher-referred, versus only 23 percent of the girls, while the rates of self-referral were quite similar for boys and girls. Of the teacher-referred girls, 90 percent also referred themselves, but only 62 percent of the teacher-referred boys had referred themselves. Boys referred themselves at a higher rate than girls in two classrooms, at a lower rate than girls in four classrooms, and at a rate (71 percent) that was not significantly different from the girls' rate (75 percent) in the seventh classroom.

Wagner concluded that teachers recognize girls' concerns less easily because child rearing practices encourage girls to be quiet, pleasant, and obedient.

Biological and Early Learning Factors

Many references dealt with biological differences, learned differences resulting from rearing and socialization, and differential reactions to school and teachers. Several dealt with peer influences. A few sources, such as Bee (in press) and the Council of Chief State School Officers' Resource Center on Sex Equity (1983), did not always indicate the specific disability area to which their comments applied. Several sources, such as Bentzen (1963), Caplan and Kinsbourne (1974), and Drabman, Tarnowski, and Kelly (1987), dealt with both ED and LD.

Two prior works (McGuffin, 1987 and Plomin, 1989) provided fairly readable explanations of recent advances in genetics and the heritability of a rather large number of

actual disabilities or the potentiality for disabilities. However, like many genetics and physiology investigators, they did not focus on gender differences.

Sources that did not specify the disability area will be reviewed first, then all those that dealt with emotional disturbance, followed by those related to learning disabilities. Within each area of disability, biological/genetic/chemical factors will be considered first, then the influence of learning and socialization, and, finally, different reactions of males and females to school.

Unspecified Disabilities - Biological Factors

A number of authors pointed out that females have certain biological advantages over males. For example, Bee (in press) noted that, even in infancy, boys are more irritable and less able to reach physical or emotional equilibrium after being upset than are girls. In this regard, Gribble (1991), an RN with extensive experience in neonatal care, reported that the great majority of newborns with serious health conditions are males.

Bee also commented that boys are more adversely affected than girls by family stresses such as parental discord, divorce, mental illness, and job loss. In these situations, boys are more likely to show disturbed behavior and declining school performance. Girls seem to be less vulnerable. Rossi (1972) and Jacklin (1989) also commented on the biological advantages of females.

Bee suggested that girls, with their XX sex chromosomes, appear to be protected from many kinds of inherited disorders and are obviously less likely to inherit any recessive disease that is carried on the sex chromosomes.

A more detailed explanation of the part which the sex chromosomes play in various disabling conditions, specifically mental retardation and learning disabilities, was given by Hagemoser and Buehler (1991).

> Mental retardation can be caused by a gene located on the X chromosome. Genes are the body's recipe to determine the body's structure, function, and appearance. Genes are passed from parent to children in packages called chromosomes. Chromosomes are found in the cells of our bodies. Each person has 46 chromosomes, half from each parent, arranged in 23 pairs. The sex chromosomes, the 23rd pair, determine the sex of the individual, XX in females and XY in males. A gene that lies on the X chromosome is called X-linked or sex linked.
>
> If a disabled or nonfunctioning gene lies on the X chromosome, it may cause an X-linked condition, such as an X-linked form of mental retardation. In a girl, if the disabled gene is on one of her X chromosomes and the matching gene is working, the girl will not show the effects of the disabled gene. However, in a boy, if there is a disabled gene on the X chromosome, because the genes on the Y chromosome do not match, there is no working gene to function properly. Therefore, the gene on the X chromosome shows its effects, and the boy is mentally retarded.
>
> Whereas in the mentally retarded population we see genetic sex differences, these sex differences have not been identified in the learning disabled population. Sex ratio differences in the LD populations seem to be a reflection of ascertainment biases and referral biases.

The question arises as to what genes are located on the male's Y chromosomes. In a personal communication, Laxova (1991) reported that the Y chromosome, in fact, contains very little genetic material. The male's rather bare Y chromosome is interesting but should be viewed in perspective, since there are 22 other pairs of chromosomes with immensely rich genetic material.

Jacklin (1989), attempting to account for the vulnerability of male newborns, noted that even in normal deliveries the births of males take an average of one hour longer than those of females.

Gualtieri and Hicks (1985) theorized and provided some evidence that the presence of a male fetus may, in some way, cause some mothers to produce antibodies which affect the unborn male child adversely.

Stott (1978) presented some ideas in line with a Darwinian evolution view point. He speculated that males are now biologically inferior to females because, evolutionally, when cyclic population crises occurred, reductions in population numbers could occur without endangering the species by the loss of males, for whatever reason, but not by the loss of females.

Several prior workers considered the influence of maturation or maturation rate differences of males and females. Bee (in press) wrote that girls at any age tend to be more physically mature than boys of the same age, which may give them more resources with which to meet various problems. The Council of Chief of State School Officers' Resource Center on Sex Equity (1983) also noted the importance of boys' slower rates of maturation.

Further, Bentzen (1963) reported that at the chronological age of six, when children enter school, girls are about 12 months ahead of boys in developmental age and at age nine the difference is about 18 months. Richardson and others (1986) said that schools, unfortunately, ignore these differences, which puts additional stress on boys, particularly those who are less able.

Finally, a study by Drabman, Tarnowski, and Kelly (1987), while not examining differences in maturation of boys and girls, did assess the importance of variations in age within a particular grade (and thus, generally, the effect of maturation) with regard to referrals for academic and behavior problems. Subjects were 172 students in kindergarten through grade 4 in Ohio and a similar group of 210 students in Mississippi, all of whom had been referred to outpatient evaluation centers because of academic and behavior problems. They found that the younger students in each class (that is, those born in the summer months and, thus, just meeting the age requirement for kindergarten entrance) were more likely to have been referred. The pattern was consistent across all grades.

Unspecified Disabilities - Learned Differences

Bee (in press) wrote that, in child rearing, parents may simply be more tolerant of disruptive behaviors in boys than in girls. Boys learn that acting out is not punished but may get results. Girls typically learn to inhibit those responses.

Condry and Condry (1978) found that adults' perceptions of infant behavior are influenced by their general beliefs about infant boys and infant girls. They presented groups of adults with a video tape of a 15-day old infant. One group was told that the infant was a boy, the other group that it was a girl. Observers described the "boy" as more active and outgoing. The "girl" was described as passive, crying, and in need of help.

Wagner (1976) observed that child-rearing practices encourage girls to be quiet, pleasant, and obedient.

Emotional Disturbance - Biological Factors

Bee (in press) suggested that the higher incidence of conduct disorders among boys could be related in some way to variations in hormones, since male hormones play a role in aggressive behavior.

Jacklin (1989) reviewed her own and others' works on hormones and behavior. In essence, the findings are complex; it is not simply a matter of male hormones (such as testosterone) producing aggressive behavior, as was suggested in earlier studies with male prisoners. Instead, for example, it is high variability of circulating testosterone levels

which are associated with anger in both boys and girls, and not necessarily high levels themselves.

Konner (1991), said that the tendency to physical violence is largely rooted in biology and is more common in males than in females. It is most common in male teenagers and young adults. The tendency to take risks runs in families, as does alcohol abuse. Stresses, like poverty, greatly increase the tendency to commit violence, but this does not mean that environmental influences are responsible for the basic tendency.[1]

Recently a number of articles dealing with the heritability of various personality traits and disorders have appeared in professional journals whose readers probably had more faith in environmental than in genetic factors. For example, the July/August 1990 issue of the Journal of Counseling and Development focused on the genetic and psychophysiological bases of several disorders of interest to social scientists.

Unfortunately, very little was revealed in these articles regarding the causes of differences in identification rates of males and females. For example, Carey (1990) reviewed several studies of fears, phobias, and phobic disorders involving twins and concluded that heredity's contribution is mainly to a trait of general fearfulness, but he did not examine gender differences.

Similarly, Raine and Dunkin (1990), reviewing twin and adoption studies, concluded that criminal behavior is determined in part by genetic factors and in part by environmental factors. Their only commentary about gender differences was that genetic factors may be more important as an influence on criminal behavior of females than on those of males. Their explanation was that, in order to overcome the relatively stronger socialization pressures against such behaviors in women, women must possess stronger biological predispositional factors than men to become criminal. The majority of this article dealt with relationships between psychophysical variables and antisocial behavior without any reference to male-female differences.

Emotional Disturbance - Learned Differences

Macoby and Jacklin (1974) examined extensive empirical evidence on sex typing and the role of modeling and differential socialization of boys and girls. Although they did not address gender differences in disability areas, their analysis of gender differences in early childhood experiences is rich and persuasive, providing a base for the notions of Kedar-Voivodas, which follow.

Kedar-Voivodas (1983), in a review of the literature on school roles and conventional sex roles, pointed out that the child's conventional sex role is part of the dynamic situation in the classroom. The conventional male sex role includes: verbal and physical aggressiveness, independence, assertiveness, high activity, dominance, impulsivity, defiance, roughness, and competitiveness. The conventional female sex role involves: conformance, passivity, dependence, gentleness, neatness, cooperation, and submissiveness.[2]

Connor, Serbin, and Ender (1978) presented various forms of a story to 105 students in grades 4, 6, and 8 in which either a male or female character behaved either aggressively, assertively, or passively. The students' approval or disapproval of the three forms of

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[1] Although Konner's comments are placed in the subsection dealing with emotional disturbance, Konner was discussing aggressive and reckless behavior rather than emotional problems. Since young males may be referred for special education because of their aggressive behavior, with a suspected disability of emotional disturbance, his comments seemed to fit here best.

[2] Since boys typically learn male roles by imitating their fathers and girls learn their roles by imitating their mothers, boys in families where there was no father might be especially prone to problems of various sorts. Girls, since their mothers were present, would tend to be less at risk.

behavior depended on the sex of the character in the story. Boys and girls responded differently to the three forms of behavior. Finally, with increases in age, girls increasingly evaluated passive behavior positively while boys increasingly evaluated it negatively.

Lobel and Hirschfeld (1984) suggested that the greater incidence of depression in females may involve "learned helplessness."

McGuire (1973) observed 70 males and 62 females, ages 3-5 years, in a naturalistic situation and assessed aggressive behavior via time-sampling. He subsequently assessed social status by a sociometric procedure. Overall, males were more aggressive than females. Interestingly, when median aggression scores were determined separately by gender, the higher aggression males were less popular than the low aggression males, but vice versa for the females.

Jacklin (1989) observed that there are gender differences in terms of who does the reinforcing of behavior. Girls respond to reinforcement given by both female and male teachers and by other girls, but not to reinforcement given by boys. Conversely, boys respond to reinforcement given by other boys but not to that given by teachers or by girls. She also reported that prior studies found that children imitate the behavior of same-sex parents, but not when the parent is doing something quite different from other adults.

Finally, Jacklin noted that cross-cultural studies indicate that "we are the company we keep." That is, whomever one interacts with elicits particular behaviors. For example, if one spends much time with an infant (whether one is male or female), the infant seems to bring forth nurturing behavior.

Emotional Disturbance - Differential Reactions to School

Kedar-Voivodas (1983), having made the point (above) that conventional sex roles are part of what boys and girls bring to school, described the dynamics of the conflict between school roles for children, which are so important to teachers, and children's sex roles, in particular the sex roles of males.

The school, as an institution, mandates certain overt academic curricula and certain hidden (management) curricula. Teachers are expected to impart knowledge and skills, but are also expected to socialize children, both to their present school roles and to some of their future adult roles in society.

Kedar-Voivodas described three school roles. The "pupil" role (to be patient, docile, passive, orderly, respectful, etc.) is needed for classroom management. The "receptive learner" role involves positive attitudes and behavior, satisfactory performance, and working efficiently despite distractions or interruptions. The "active learner" role goes beyond the established academic curriculum and includes curiosity, active probing and exploring, challenging authority, insisting on explanations, and a self-discipline that serves the demands of scholarship rather than the wishes and demands of others. The active learner role calls for sublimated forms of aggression, rather than submission to constraints.

The need to maintain classroom control makes teachers much more concerned and negative about acting-out and anti-social behavior than about withdrawn, apathetic, and introverted behavior, regardless of the level of severity. Disruptive or aggressive behavior requires a teacher's attention and cannot be ignored, particularly when aimed at other children. Such behavior also represents a serious and visible threat to the teacher's authority and prevents effective instruction.

Obviously, the conventional male sex role is much more consistent with acting-out behavior. If sublimated, it is consistent with the active learner role, while the conventional female sex role is consistent with the pupil role and the passive learner role.

Kedar-Voivodas said it is not surprising that teachers, whether male or female, view boys more negatively than girls and identify more boys as having conduct or deportment problems. Nor did she find it surprising that boys are found to be less well adjusted in school.

She noted that prior studies, in which fictitious case histories were presented to teachers, where the sex of the child with problems was sometimes male and sometimes female, often showed no gender bias. Respondents' decisions about whether or not to refer the child were tied more closely to the presence or absence of defiant, aggressive, or disobedient behavior than to the fictitious child's sex. However, in prior studies of teachers' interactions with real children in their own classrooms, many more boys than girls were referred or were nominated as "the child I would be most relieved to have removed from my class."

She said that a real boy in a real classroom, faced with the conflict between acting out (which is congruent with the male role) and the teacher's demands to conform to the pupil role, has three main options: first, to accommodate to the teacher's expectations; second, to bring about some change in the teacher's expectations; or third, to reject the source of the conflict by silent indifference or by disruption and aggression. While the second option may be most desirable, young boys do not have the power to carry it out. As a result, they only have two options — conform to the authority of the teacher or reject that dominance.

Geiger and Turiel (1983) studied 42 junior high school children. The children included 11 males and 11 females who had been sent to the office for disruptiveness in one year, but not the previous year, and 20 who were non-disruptive (10 males and 10 females). In a "social conventions" interview, the interviewer posed hypothetical problems in story form and asked a series of questions which were aimed at determining the child's position on a seven-level sequence of stages. The seven stages alternatively accept and reject conventions (that is, conventional rules). Interview results were scored "blind."

They found that the disruptive children were typically at a stage of rejection. Most of the non-disruptors were at the next level where rules and conventions are accepted.

A year later, seven of the disruptors were still classified by the school counselor as disruptive and 13 as non-disruptive (two were no longer in that school). On retest in the social conventions interview, it was found that 11 of the 12 who were no longer classified as disruptors had moved up to (or nearly up to) the next level (acceptance) and one stayed at the rejection level. Of the seven who were still disruptive, none completely reached the next level (acceptance of rules). Three moved up partially, and four did not move at all.

Geiger and Turiel concluded that disruptive behavior in the classroom is closely related to the rejection of conventions or rules. Further, most children who become disruptive in one year become non-disruptive a year later. That is, the social development of adolescents undergoes change over time.[3]

Learning Disabilities - Biological Factors

Five prior works were found on genetic factors and one on physiological factors related to learning disabilities, to some extent focusing on dyslexia. Since they were written at rather different points in time, they are presented in chronological order.

Hallgren (1950), in a monumental study, personally investigated 706 persons. These included 276 whom he determined to have specific dyslexia (116 index cases and 160 who were their parents or siblings), 221 unaffected parents and siblings of the index cases, and 212 controls (non-dyslexics). The study was done in Sweden and all subjects were Swedish.

Tests for dyslexia included: oral reading, writing to dictation, and auditory word discrimination. Other variables studied included: birth history, health history, visual and hearing defects, speech defects, handedness, hand and eye dominance, intelligence, nervous

[3] It would appear that the disruptive behavior of a child, while appearing to be long-lasting to the teacher in whose classroom it occurs, often dies out with time or with non-rewarding consequences. Thus, one strategy for dealing with disruptive behavior may involve waiting it out tolerantly rather than making a referral for suspected exceptional educational needs.

disorders, and environmental factors, such as social class, single-parent home, and severe neglect.

He found that dyslexia was associated with speech defects in boys, but not in girls. It was moderately associated with left-handedness. It was associated with being "a problem child" and with having nervous symptoms such as nail-biting. Among other things, it was not associated with starting school at an early age (but see Drabman, Tarnowski, and Kelly, 1987, in the sub-section on unspecified disabilities-biological factors, above).[4]

Of Hallgren's 112 families of dyslexic children, 99 (88 percent) had one dyslexic member or more. Of the remaining 13 cases, eight appeared to involve environmental factors. Thus, a strong case is made for the heritability of dyslexia.

Hallgren's study indicated that the actual prevalence rates of dyslexia, or "word blindness" in males and females are much closer than is usually believed. A more important contributing factor than sex is whether or not either of the child's parents was dyslexic.

Rossi (1972) presented a review of the literature, interwoven with theory, on inherited genetic conditions which, he felt, contribute to learning disabilities and, perhaps, to emotional disturbance.

While the chromosomal contributions of parents determine a child's genetic make-up, there is a certain randomness in the process, as shown by the fact that siblings, even fraternal twins, are genetically different. Studies of family data indicate that dyslexic children have at least one dyslexic parent or relative. Children with perceptual-motor deficits, dysarthria (speech or language disabilities), or dysgraphia (an inability to write) have a parent or relative with the same deficit.

He indicated that these deficits appear to be related to a pre-puberty insufficiency of gamma-amino-butyric acid (GABA), an inhibitory chemical transducer. At puberty, a natural, neurophysiological maturation occurs, more noticeably with boys than girls, with improvements in the three inherited disabilities (dyslexia, dysarthria, and dysgraphia).

Rossi suggested that every emotionally disturbed or slow learning child should be examined for the soft neurological signs of a developmental lag of the cerebral ascending reticular activating system (ARAS) pathways.

Rossi noted that remedial programming and special education efforts can be enhanced if this deficiency is repaired with chemotherapy. One must distinguish between learning-disabled children with a biochemical condition and those whose problems are due to psychological factors, such as early negative conditioning, intolerance for anxiety, threat to omnipotence, fear of learning, and lack of motivation.

Finucci and Childs (1981) conducted a follow-up study of 500 boys with reading disability (RD) who had attended a special school as children and who responded to a questionnaire as adults.

They found that 13 percent of the subjects' 480 male siblings and 7 percent of their 542 female siblings were also reported to have RD (a male to female ratio of 1.9:1. Some 30 percent of their sons and 18 percent of their daughters were reported to be affected (a ratio of 1.7:1).

DeFries (1989) examined four prior studies which reported male to female ratios of identified dyslexic children and male to female ratios of their dyslexic parents, siblings, or offspring. The male to female ratios for the index cases ranged from about 3:1 to about 6:1, while the male to female dyslexic ratios for their family members ranged from about 1.2:1 to 2:1.

DeFries noted that earlier investigators (Hallberg, 1950, and Finucci and Childs, 1981) had concluded that the observed discrepancies between the large male to female ratios of the index cases (who were referred and identified in the schools) and the smaller ratios of

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[4] One should not conclude that a child who has one or more of the characteristics which Hallgren found to be associated with dyslexia is, in fact, dyslexic, nor that a child who has none of those characteristics could not possibly be dyslexic. Hallgren's observed associations between dyslexia and other conditions were not perfect, one-to-one associations.

their family members were due to ascertainment biases (that is, errors in identification) by the schools. However, DeFries suggested that these discrepancies may not be due entirely to ascertainment biases, but may also be a consequence of the manner in which dyslexia is transmitted.

DeFries offered the "polygenic threshold model" of Carter (1973) as a way to explain the disparity. This model assumes that conditions such as dyslexia are influenced by both genetic and environmental factors.

He reasoned that, since the prevalence of dyslexia is much lower among females than among males, females must have a higher threshold of risk. That is, to be dyslexic, females must have a higher combination of disadvantageous genetic and environmental factors involved. DeFries noted that about 7.5 percent of males and about 2.5 percent of females exceed their respective thresholds.

This interpretation of the threshold model led DeFries to predict that the reading disability (RD) prevalence rate of the relatives of females with RD would be higher than that of the relatives of males with RD.

In an earlier study Defries did find that both the parents and the siblings of females with RD were at a higher risk for RD than those of males with RD. In the present study, both the fathers and the mothers of females with RD self-reported more difficulties in learning to read than did the parents of males with RD.[5]

Recent research has been aimed at determining the locations of specific genes associated with dyslexia (Smith, 1991). Specifically, a "linkage analysis" is being used to assess familial dyslexia. Chromosomes six and fifteen are the sites currently being investigated. The sex chromosomes do not seem to be involved.

LaBuda, Defries, and Pennington (1990) used data from the Colorado Reading project. The school records of same-sex twin pairs were screened for evidence of reading difficulties (reading test scores referrals due to poor reading performance or reports by school psychologists). A total of 96 identical and 72 fraternal twin pairs in which at least one member had reading problems comprised the subject group. Subsequent testing with three subtests of the Peabody Individual Achievement Test (reading recognition, reading comprehension, and spelling) provided diagnostic criteria.

Regression analyses were carried out, using zygosity (identical versus fraternal status) and sex of the twin pair as predictors. It was found that about 50 percent of the deficit of a reading disabled child may be attributed to genetic factors and the remaining 50 percent to environmental factors. An extended regression analysis found a nonsignificant difference in the extent to which genetic factors are involved in the reading performance of male twins versus female twins.

Livingstone et al. (1991) recently reported finding that certain cells in the macrocellular visual pathway (the "macro cells") are smaller and less well organized in dyslexics than in non-dyslexics. Apparently, these cells are needed to "erase" the otherwise persistent image of a preceding visual stimulus so that eye and brain can go on to a new image. Information related to gender differences was not presented.

Learning Disabilities - Learned Differences

While the main focus of the article by Kedar-Voivodas (1983) was on the association between disruptive behavior and the conflict between boys' sex roles and the roles demanded by school, she also noted that boys' achievement was affected by that conflict.

Gross (1978) observed that, among Israeli children who are raised on kibbutzes, the same proportions of boys and girls had learning disabilities. She commented that in the

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[5] Defries was the only author who considered the possibility that having been reared by non-reading parents might affect a child's ability to read.

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United States there are fewer girls identified as having learning disabilities than boys because American society and schools reward girls' passive behavior.

The reference by Gross raises the issue of differences between American society and culture in the United States and those of other countries. It is interesting to note that among the children served in special education programs of the prefecture of Chiba, Japan, 65 percent are males and 35 percent are females (Chiba , 1991). Unfortunately, break-outs by disability are not immediately available.

Learning Disabilities - Differential Reactions to School

In Kedar-Voivodas' wide-ranging review (1983) it was made clear that many boys do react to the role demands of school in quite different ways from those of girls. Boys' reactions may or may not cause more boys than girls to have learning disabilities, but they certainly influence teachers to notice boys more and, probably, to refer them more often for special education evaluation.[6]

Caplan and Kinsbourne (1974) described some revealing social values and perceptions of children who are failing - particularly the boys. They conducted structured interviews with 190 children, ages 6-12 who were achieving at grade level, and with 32 other children (18 males, 14 females) of about the same ages in a summer institute at Boston University for children who were failing.

The children were shown six dolls (3 males and 3 females) and were asked to indicate "Which one is smarter than all the others?" "Which one is nice and quiet?" "Which one fights with people?" They were also asked 22 direct questions, such as "Are boys supposed to be smart in school?" "Are girls supposed to be smart in school?" "Is it good to be smart?" "Is it good to be nice?" In a final set of items the children prioritized being smart, being nice, being a leader, and being good at sports.

The achieving children (regardless of sex, race, age, or social class) ranked being nice and then being smart far ahead of being good at sports and being a leader. The failing boys especially, and the failing girls less so, ranked being smart first and being nice second.

Most of the achieving children said that the girls (a girl doll) were the nicest and the smartest, but the boys were good at sports or were the leader. The failing boys, more than the achieving boys, said that the boys were smarter and were best at sports. They also said more often that the girls were noisier in class and were the ones who do not want to do well in school. In Caplan and Kinsbourne's opinion, the failing boys were aggressively and unrealistically critical of the girls.

The failing girls did not denigrate boys more than the achieving girls did, but they agreed more often that it was "not okay for boys to fight and make noise." This suggested that failing girls have the option to side with the teacher.

Caplan and Kinsbourne interpreted these findings to mean that boys' alternatives to being smart are more limited than those of girls. Further, those alternatives (being good at sports and being a leader) are more rigorous, less desirable generally, and less likely to be rewarded. The positive note is that boys with learning problems, being more likely to act out, are more apt to be noticed by teachers and receive some help.

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[6] It is possible that elementary school boys who have rejected the teacher's authority, whether by silent indifference or disruptive behavior, may miss out on the presentation of important, basic skills and never really catch up.

Causal Factors Related to the Referring Adult

A very large number of prior works were found which studied the relationships between actual referral decisions and various characteristics of the referring adult, most of whom are regular classroom teachers. The sub-sections presented below treat teacher gender and other teacher characteristics within multiple (or unstated) disability areas, emotional disturbance, and learning disabilities.

Before considering those studies of actual referrals, several studies are reviewed in which the adult subjects were given fictitious case histories of students with problems. The student was sometimes a boy and sometimes a girl. In several studies other characteristics of the student were systematically varied in the case history.

Fictitious Cases

Five prior studies presented fictitious case histories to adults, most of whom were teachers, and asked for judgements about referral or non-referral for special education assessment or for other judgements about the cases.

Walker, Bettes, and Ceci (1984), focusing on emotional disturbance, gave each of 100 employed preschool teachers three case histories which depicted, respectively, three syndromes: aggression, hyperactivity, and withdrawal. The subjects were asked to rate the child's severity, long-term outcome, stability, and the importance of constitutional factors (that is, characteristics which are inherent in the child) versus environmental factors. They were also asked to judge the need for referral to a mental health professional. The sex (male, female) and the age (3.5, 5.5) were systematically varied in various forms of the case histories.

Whether the child was reported to be a boy or a girl made little difference in respondents' ratings and judgements. However, when asked to name the most difficult child in their own class, 78 percent of the teachers named a boy and 22 percent named a girl.

Of the three syndromes, aggression was rated the most severe and as having the most negative long-term outcomes. It was judged to stem more from environmental than from constitutional factors, and it resulted in more "referrals" than either hyperactivity or withdrawal.

Gregory (1977) presented each of 140 elementary school teachers (113 females and 27 males) with five behavioral reports of children with different situations (reading problems, withdrawn, gifted, arithmetic problems, and aggressive behavior). They were asked to indicate whether the child ought to be referred for help of any kind. Gender was systematically varied.

The child's sex was a significant variable in all situations but reading problems. In all of the other four situations the "boy" was rated as needing to be referred for help more than the "girl." This gender difference was greater for aggressive behavior and withdrawn behavior than for arithmetic problems or giftedness.

Ritchie (1986) presented Australian guidance counselors with information on a fictitious child whose sex, age, reason for referral, IQ, and attainment were systematically varied. He found that judgements of whether the child was disabled were related to reported attainment and IQ, but not to sex.

Caplan (1977) presented 280 undergraduates (sic) with 16 one-line descriptions of elementary students with school problems, for example: "An 8-year old girl, withdrawn, having trouble with reading." All 16 descriptions appeared on a single sheet of paper. They presented two different student ages (6 and 8), two genders, two behaviors (withdrawn and acting out), and two problem subjects (reading and math). The respondents ranked the 16 cases regarding which of them should be given tutoring help (which was supposed to be in limited supply).

Tutoring help was given significantly higher priority for children of age 8 than age 6, for males than for females, for withdrawn than for acting out behavior (in contrast to typical findings), and for reading than for math problems. All of these comparisons were significant at the .0001 level. Values of Chi-squared (an index of association used with categorical variables), in descending order, were: problem subject (1013.9), problem behavior (542.1), sex (122.0), and age (99.2).[7]

Tobias, Zibran, and Menell (1983) conducted a fictitious case study with 320 summer session graduate students in education who had teaching experience in either regular or special education and at either the elementary or secondary level.

Eight forms of a fictitious 10-year old's case history were provided. Half gave the student's sex as male and half as female. Within each sex the student's racial/ethnic category was either given as black, Hispanic, or white, or no category was given. Respondents were anonymous, but provided various demographic data on themselves. Respondents made judgements regarding the need for referral and for psychological evaluations.

No student gender effects were seen with regard to referral decisions. However, there were significant differences in judged need for referral among teacher levels and types. Secondary teachers gave the lowest ratings of need for referral (mean = 5.0 on a 9-point Likert-type scale), elementary teachers were next (mean = 5.6), and special education teachers gave the highest ratings for referral (mean = 6.3).

Emotional Disturbance - Teacher Gender

McIntyre (1988), in the survey of 92 elementary teachers in Jackson County, Oregon, found that of the 25 male teachers, 12 (48 percent) had made one or more referrals for special education during the year and 13 (52 percent) had not. Of the female teachers, 48 (72 percent) had referred students and 19 (28 percent) had not. The difference occurred mainly in severe cases. When considering children with moderate problem behavior, the male and female teachers' referral rates were not significantly different.

As reported below, West (1978) found no difference between the mean numbers of actual referrals by male and female teachers.

Gregory (1977), in the fictitious case histories study reviewed above, separately examined the referral ratings by male (N = 27) and female (N = 113) teachers for "boy" versus "girl" students with five types of exceptional needs (including giftedness). She found that male teachers, more than female teachers, recommended referral more often for boys than for girls in cases where the child was aggressive.

While not studying special education referrals, Mendell (1968) did observe that male teachers tended to choose heavier penalties for misbehavior than did female teachers and that penalties chosen for male students were heavier than for female students. Finally, teachers tended to choose heavier penalties for students of the same sex than for students of the other sex.

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[7] Thus, the area of academic difficulty and the nature of the child's behavior problems were more potent factors in referral priorities than were the child's sex or age, at least for the respondents in this study. Perhaps elementary teachers, if given the same task, would show a different pattern of priorities. One particular strength of this study was the factorial arrangement of the four independent variables. Each was presented in the presence of each of the other combinations, and, consequently, each independent variable was pitted against each of the other three. The values of Chi-squared indicate the relative importance of each of those four independent variables.

Good, Sykes, and Brophy (1973), observing regular education classrooms, found that female teachers were more tolerant of misbehavior than were male teachers and were more likely to warn students about their behavior, while male teachers were more likely to criticize students more intensely. Further, male teachers were more likely to praise male students than female students, while female teachers tended to treat boys and girls more equally.

Emotional Disturbance - Teacher Variables Other than Gender

West (1978) examined the records of 3,806 actual disciplinary referrals made during a 6-month period by the 551 teachers of six middle schools and six high schools in one county in Florida (one district).

The mean number of referrals was 6.9 per teacher, but 24 percent of the teachers made no referrals. There was no difference between the mean number of referrals by female and male teachers. White female teachers had the highest mean number of referrals (7.2); next were white males (6.8) and black females (6.6). Black male teachers had a mean of 4.8 disciplinary referrals. The only significant difference was that between white female and black male teachers.

White female teachers referred significantly more black female students and significantly fewer white males. Black female teachers referred significantly more white females and significantly fewer black females.[8]

While Kedar-Voivodas (1983), in her discussion of expected school roles and boys' conventional sex roles, did not address the issue directly, one implication of her comments is that teachers who can tolerate boys' deviations from the expected "pupil" and "passive learner" roles would be less likely to refer them for special education evaluations.

This construct of teacher tolerance was touched upon by Ysseldyke et al. (1982), along with a large number of other issues related to referral. Because their investigation, more than any other, delved into the thoughts and perceptions of the referring teacher, the review will describe the whole study and its findings, although the study itself involved other factors than teacher characteristics. Further, since their study examined referrals in general, it has as much to do with learning disabilities (academic problems) as with emotional disturbance (behavior problems).

Respondents were 105 regular education teachers in 10 states. They responded to a two-page survey with reference to the student they referred for special education assessment next after having received the survey. Survey questions were open-ended. Topics covered in the survey were: student characteristics, reasons for referral, attributions as to the causes of the student's problems, pre-referral interventions, the respondent's desired outcomes of referral, and desired changes.

Of the referred students, 70 percent were males and 30 percent were females. Most were K-3. More than half were rated poor or very poor, compared to their peers, on speed of learning, motivation, maturity, and judgement. Both sexes were referred more often for academic than for behavior problems.

In 62 percent of all cases the cause attributed to the child's problems involved stable, inherent student characteristics, such as low ability. Next came environmental causes, mostly home and family conditions (48 percent of the cases). Note that more than one cause could be given, so the total is greater than 100 percent. The institutional or environmental setting (that is, the child's school, classroom, or the teachers themselves) was mentioned in only 3 percent of the cases. The authors suggested that teachers are willing

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[8] These and similar results found by Tobias (1982) suggest that the greater the differences between teacher and student, the more likely is a referral.

to accept credit for their student's successes but are likely to attribute failure to the student or the home.

Most of the pre-referral interventions were done by the classroom teacher without consultation or planning with other school staff, and most of these interventions dealt with variations in instruction (such as behavioral strategies, peer tutoring, and seat changing). Only a few were clearly based on accepted principles of learning.

The four outcomes desired most often were: placement (30 percent of all cases), testing (19 percent), instructional decisions (18 percent), and educational suggestions (12 percent).

When the referred children were girls, the teachers rated them, more than was true for boys, as being lower than their peers on ability to learn and speed of learning. Teachers reported more often for girls than for boys that they had used structured, pre-referral interventions (such as peer tutoring and seat changes). Teachers rated referred boys, more than the referred girls, as being lower than their peers on behavior. They referred a greater proportion of boys for behavior problems than girls and used behavioral strategies prior to referral more often with boys than with girls.

The authors suggested that some teachers believe they have little control over the causes of students' problems (perhaps a form of learned helplessness). Attributing the causes of students' problems to the student's stable, inherent characteristics or to the home takes the teacher off the hook.[9]

Ysseldyke and his colleagues reported that most teachers only offered one or two possible causes of the child's problems and did not take the ecological approach of examining the context in which the child's problems occurred. They noted that teachers seem to believe that they can control for, adapt to, or tolerate low academic skills but require their students to be receptive for learning. Finally, teachers' preference for placement as a referral outcome suggests the need for attitude changes regarding the outcomes of referral. The authors stated that a better outcome of referral than placement would be instructional planning, perhaps employing those persons who would ordinarily be M-team members.

Learning Disabilities - Teacher Gender

Gregory (1977), in the study of fictitious cases of children whose exceptionality was either: reading problems, withdrawn behavior, giftedness, math problems, or aggressiveness (see above), found that female teachers, more than male teachers, were apt to refer boys with math problems more than girls with math problems.

Learning Disabilities - Other Teacher Characteristics

A very large number of prior works addressed either the observed or the suspected influence of various teacher characteristics on differential referrals of males and females for suspected learning disabilities. Many of them dealt as much with suspected emotional disturbance as with learning problems. The great majority of these studies found that greater numbers of males than females were referred. Many of these authors indicated that the cause of the disparity was gender bias on the part of the referring adult.

There were a few works that either did not find differences in the referrals of boys and girls for suspected exceptional educational needs or presented information which pointed toward other causes of the observed disparity than gender bias or stereotyping.

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[9] This is an example of the problems associated with evidence based on participants' reports. As so often happens, the respondents who are closely involved in the phenomena of interest explain or account for those phenomena in ways that maintain their own sense of well-being. Ysseldyke and his colleagues, quite correctly, question the validity of this evidence. Yet the perceptions of referring teachers are of considerable interest, since they represent part of the dynamics of the referral process. Any solutions to problems of inappropriate referrals will have to take into account the referring teachers' perceptions, motives, and sense of well-being.

It is possible to tally, on one hand, the works where gender bias was either stated as a causal factor or implied and, on the other hand, those that suggested other causes of the disparity in referrals. Because the procedures used to gather evidence may have an influence on the evidence obtained, works are grouped according to the procedures used. Finally, since there are so many works involved, only brief descriptions of the nature of the evidence in each case are here.

Five sources specifically considered the influence of genetic factors as a cause of the gender disparity seen in learning disabilities. One, Hagemoser and Buehler (1991), indicated that there was no evidence that genetic factors contributed to that disparity. Four other writers found what they considered to be evidence of genetic factors influencing learning disabilities, particularly dyslexia, but all made some reference to the existence of ascertainment and referral biases. Those sources were:

- Hallgren (1950) Personal study of 116 dyslexic Swedish children and their families.
- Rossi (1972) Review of literature and theory, biochemical and genetic factors prior to and during puberty.
- DeFries (1989) Review of literature and theory, genetic and environmental factors in combination.
- Bee (in press) Review of literature, genetic and biochemical factors.

Five prior studies presented adults with fictitious case histories (or brief descriptions) of children with school problems and asked the adults whether or not the child should be referred.

The sex of the child was randomly varied (male or female) on different forms or on different item descriptions.

Two of these studies found that "boys" were referred in greater proportions than "girls." These were:

- Caplan (1977) 280 undergraduates, 16 brief descriptions.[10]
- Gregory (1977) 140 elementary teachers, five forms of exceptionality.

Three other studies using fictitious case histories did not find more "boys" being referred than "girls:"

- Ritchie (1986) 79 Australian guidance counselors.
- Tobias et al. (1983) 320 education graduate students.
- Walker et al. (1984) 100 preschool teachers, three forms of disturbance.[11]

No sources found equal numbers of boys and girls actually referred for possible emotional disturbance or learning disabilities. Many suggested, on the basis of their reviews of prior literature, that gender stereotypes or bias were a prime cause of the difference in referral rates. These were the works by: Corbett, Lea, and Zones (1981), Council of Chief State School Officers' Resource Center on Sex Equity (1983), Fine and Asch (1981), Gillespie and Fink (1974), Hollingsworth and Mastroberti (1983), Kratovil and Bailey (1986), the National Information Center for Children and Youth with Handicaps (1990), Richardson and others (1986), and Vogel (1990).

Fourteen other prior works studied actual referral rates in local school districts. Of these, nine concluded that gender stereotypes or bias on the part of the referring teacher were contributing factors. The form of that bias varied, and the writers did not ask the teachers why they had referred boys more often than girls.

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[10] It should be noted that in Caplan's study, the academic problem area and the type of behavior manifested by the fictitious child were more potent factors in referral decisions of her respondents than was the child's sex.

[11] Note that when Walker et al. asked the teachers for the name of the most difficult child in their own class, 78 percent named a boy. It may be that in these three studies, the fact that the child was a boy or a girl was lost to the respondents amongst all the other information provided to them. As a result, the other information became more salient. In the real classroom, most elementary teachers are quite aware of whether a child is a boy or a girl.

The nine articles specifically citing gender bias were: Emery (1973), Gross (1978), Holowinsky and Pascale (1972), Lienhardt and others (1982), Naiden (1976), Shaywitz and others (1990), Shinn, Tindal, and Spira (1987), Tomlinson et al. (1977), and Wagner (1976).

The five studies of actual referral rates which did not conclude that gender bias was a contributing factor (although it may have been), but which either dealt with other referral issues or simply reported referral demographics were: Harris et al. (1987), Lietz and Gregory (1978), McIntyre (1988), West (1978), and Ysseldyke, et al. (1982).

Causal Factors Related to Criteria, Procedures, and Tests

Flaws in Identification Criteria

Gillespie and Fink (1974) raised the following questions about the identification process: How are children selected for special education programs? What behavioral indices are used? To what extent do current guidelines and referral processes permit sex biases to have an influence?

That teachers are influenced by irrelevant student characteristics was shown in a study by Algozzine, Schmit, and Mercer (1981), cited by Shinn and others (1987). They noted that student-teacher interactions differ as a function of a child's perceived attractiveness.

Ysseldyke, et al. (1982), in a study of regular education elementary school teachers who had made referrals, noted that reasons given for the referral were general and subjective. The interaction between a student and the educational environment was seldom considered as a factor. Pre-referral interventions were not systematically monitored in order to see whether and how well they worked. These flaws contribute to inaccuracies in referral in general and may also contribute to the gender disparity.

Lienhardt, Seewald, and Zigmond (1982) observed that teachers use varying standards when referring children for special education assessments. Smaller levels of deviance were required to send a white male for suspected learning disabilities than were required for blacks or females. Boys were often referred and placed in learning disabilities programs because of deviant or aggressive behaviors which were unrelated to their academic performance.

Shaywitz et al. (1990), noted that research-identified children with learning disabilities were reported more often by their teachers to have problems in attention, fine motor skills, language, and academics, but not to have problems in activity level or behavior. It was implied that problems in attention, dexterity, language, and academics are the signs teachers should use for early identification. By contrast, the school-identified children were reported to have more excessive activity levels and behavior problems, which are typical of boys in the regular population.

Vogel (1990) wrote that there is an apparent mismatch between the female dyslexic's problems and the screening agent's expectations as to the characteristics manifested by a learning disabled child. This is largely a result of the scarcity of research on girls with learning disorders and over-generalizations from research which used subjects who were mostly boys.

Kratovil and Bailey (1986), in their review of the literature, pointed out that judgements in emotional disturbance and learning disabilities are extremely subjective. That is, different observers of the same behavior would not agree on whether it reflected exceptional educational needs or not. Whether consciously or unconsciously, teachers may refer many boys as a classroom management device to remove disruptive students.

Flaws in Procedures and Tests

As mentioned earlier, Gillespie and Fink (1974) asked for a complete evaluation of the processes by which children are identified, decisions are made for referral, and the determination is made whether children do or do not have exceptional educational needs. They asked specifically: "What diagnostic tests, measures, observations, etc. are used? How culture-fair and gender-fair are they? How objective are the people who use them?"

Algozzine, Christenson, and Ysseldyke (1982) surveyed directors of special education regarding the percentage of referred elementary school students who were evaluated and the percentage of evaluated students who were subsequently enrolled in special education programs. Results were obtained for three consecutive years.

The mean percentage of referred students who were evaluated was consistently 92 percent across all three years. There were large differences among districts. In some as few as 40 percent of all referred students were evaluated and in others as many as 100 percent. The mean percentages of evaluated students who were later enrolled in special education were 74 percent, 73 percent, and 72 percent in the three successive years. However, enrollment percentages for individual districts ranged from 10 percent to 100 percent.

Urban school districts' mean rates of evaluation of referred students (87 percent) and evaluated students enrolled (62 percent) were much lower than the corresponding rates for suburban and rural schools combined (93 percent and 73 percent, respectively). Regional differences were seen with regard to the percentages of evaluated students who were enrolled. Schools in the south enrolled a greater proportion (80 percent) of those who had been evaluated than did schools in the northeast and north central states combined (67 percent).

Algozzine and Ysseldyke (1981) presented 224 Minnesota educators with a computer-simulated decision making task similar to the M-team process. Subjects were: 84 special education teachers, 59 regular education teachers, 30 school psychologists, 28 administrators, and 23 others, such as school nurses and social workers. Knowledge of various aspects of psychoeducational assessment was assessed by a 25-item pretest.

Each subject was given a fictitious fifth grade student's referral folder in which the student's demographics (age, sex, etc.) and the reasons for referral were described. Subjects were then given access to an interactive computer terminal which allowed them to view the "student's" results on 49 different assessment devices in seven different domains: intelligence, achievement, perceptual motor abilities, adaptive behavior, behavior ratings, language, and personality. In all cases and on all measures, the data indicated that the "student's" test performance and behavior were *within the average range*. (emphasis added)

When finished with the examination of data, subjects were asked to indicate whether the "student" was eligible for special education services, and if so, which disability area was involved and what level of placement restrictiveness would be most appropriate.

Algozzine and Ysseldyke found that about 51 percent of the participants identified the "student" as being eligible for special education services. The disability most often cited was learning disabled. Emotional disturbance was also frequently reported. Recommended placements tended to be of the less restrictive sort, either a regular class with consultation or a part-time resource room. This was especially true for participants who had scored higher on the pretest. There were few differences among participants of different professional categories.

They felt that the referral information (which, while reflecting normal behavior, did suggest academic or behavioral problems) may have influenced the participants so strongly that they tended to discount the test results.[12]

In a follow-up study, Ysseldyke et al. (1982) made video tape recordings of 18 actual placement (M-team) meetings where children were suspected of having learning disabilities. These meetings averaged 30 minutes in length and ranged from five to 57 minutes. Most involved elementary students. The M-team meetings were taped in a number of different school districts in three midwestern states (Ysseldyke, July, 1991).

The data collected from these tapes were participants' statements about expected performance (such as: "Her IQ is above average," etc.), about actual performance (such as: "She is working on book six in Addison-Wesley math," etc.), or about discrepancies between ability and achievement, between verbal and performance measures, or other significant deficiencies. Statements were coded as to whether they would support, refute, or be irrelevant to a determination of learning disabilities.

Of all statements made, 83 percent were judged to be irrelevant to a determination of learning disabilities, 12 percent supported the eventual decision, and 5 percent ran counter to that decision. The irrelevant statements included procedural matters, the referral process, and descriptions of the student's behavior that were not related to learning disabilities.

Of the 12 children judged to have learning disabilities, four involved no relevant supporting statements of evidence. Of the six children judged not to have learning disabilities, one had no relevant supporting statements of evidence.[13]

Hoffmeister (1988) and Hoffmeister and Ferrara (1986) compared referral decisions in learning disabilities made by an expert system with those made by schools in the cases of 234 students.

An expert system is a computer program that uses artificial intelligence and knowledge engineering to emulate human decision-making. The system utilizes a knowledge base and certain decision rules (provided by the user) and renders decisions with specified levels of certainty of being correct. The knowledge base and decision rules can be revised on the basis of field tests or the input of expert consultants.

In a total 78 of the 234 cases, the expert system and school-based decisions differed. A panel of expert judges reviewed these 78 cases. In 72 cases, the expert judges agreed with the expert system's decisions. In all six of the remaining cases, the expert system had indicated that it was a borderline decision.

Clarizio and Phillips (1988) studied technical aspects of the diagnostic process after learning disabilities referrals are made, specifically in regard to the way discrepancies between ability and achievement levels are calculated. Their study dealt with classification errors in general and not specifically with those errors as a likely cause of the observed disparity between males and females in learning disabilities programs. Certain calculation methods result in more false positives and fewer false negatives while other methods have the opposite results.

As reported earlier, Shaywitz and others (1990) compared the identification of learning disabilities by schools with identification based on the discrepancy between intelligence and achievement screening measures. The research-identified learning disabilities cases

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[12] It may also be that presenting the test results in such an unusual manner and in such great quantity was either confusing or aversive. As a result, the test information may have been ignored or even rejected.

[13] Taken together, these two studies by Ysseldyke and his colleagues are surprising and distressing. They raise serious questions about the M-team process: Do such things happen in Wisconsin? Do they happen with regard to areas other than learning disabilities? Do M-team members ignore or reject test scores and, if so, why? What are the indicators of an M-team meeting of high quality? It is clear that the operations of M-teams constitute an important area for study. Replications of these two studies, or slight variations of them to clean up certain procedural problems, would be enlightening.

included fairly equal proportions of boys and girls, while the school-identified cases included many more boys than girls.

One implication of their findings is that if the identification process were based on objective screenings of all pupils, instead of teachers' referrals, the proportions of boys and girls referred for learning disabilities would be much more equal.

Shinn, Tindal, and Spira (1987) carried out a similar study comparing 570 elementary students referred for reading difficulties with about 2,500 non-referred students. They also examined sex and race differences. The screening device used was a test of reading aloud. A child's score was the number of words read correctly.

While reading performance differed significantly between the two groups, referred and non-referred, there were a fairly large number of children who scored low but had not been referred. Males were referred disproportionately more than females in grades 2, 3, and 4. Blacks were referred disproportionately more than whites in grades 4, 5, and 6.[14]

Problems associated with tests were reported or implied in three of the works that were reviewed.

Salvia and Ysseldyke (1981) noted that the identification system places a heavy emphasis on testing and assessment, often using devices that are, at best, marginally technically adequate.

Hathaway and Corbett (1981) commented on bias in testing, which can result in inappropriate placement and tracking. The testing and evaluation procedures used by schools must not discriminate on the basis of race/national origin, sex, or disability. Unfortunately, some educators rely on the results of a single testing instrument.

Another problem stems from the wide variety of different measures that are used to assess intelligence and achievement. For example, Clarizio and Phillips (1988), when comparing alternative computations of discrepancies, reported that their 12 school districts employed five different IQ tests and six different reading achievement tests. With different instruments it is likely that students found eligible for either ED or LD in one district, might not be found eligible in the next district.[15]

Miscellaneous Causal Factors

Ysseldyke et al. (1982), in their survey of regular education teachers' most recent referrals, indicated that the number of referrals in the previous three years reported by their respondents ranged from none to nine.[16]

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[14] It is worth noting that all of the studies showing inconsistencies between teacher identifications and identifications based on test results implied that the tests were more valid bases than teacher referrals. Further, none of those studies used more than one test. Beyond that, no two studies involved the same test. Considerable faith has to be put in a 20-minute test which assesses two or three areas of academic performance to believe that it is a more valid means of identifying a child with learning disabilities than the judgement of a teacher who has observed a child over time in a number of different academic tasks.

[15] Some schools use achievement measures for identification of learning disabilities which are too difficult to serve that purpose well. A preferable test is one which is relatively easy for most students since it generates a skewed distribution of scores in which the lower ranges of scores are more spread out than are the upper ranges. This is desirable for distinguishing children with learning disabilities from children who are achieving at their expected levels. Tests that are of appropriate difficulty for "normal" children provide cut-points which yield too many false positives and false negatives.

[16] The range of referrals made indicates that there are significant differences among teachers. However, there is not enough information to tell whether such wide variations among teachers are due to differences in certain personal characteristics of teachers, to school policies and practices that either encourage or discourage referrals, to differences in schools' financial conditions, to the grade level involved, or to actual variations in students' exceptional educational needs from one community to another.

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Algozzine, Christenson, and Ysseldyke (1982), in their survey of special education directors, observed that community type and region of the country influenced certain aspects of the referral and placement process.

Christenson and her colleagues (1981) found that teachers could identify certain internal, school-related factors and certain external factors which influenced their decisions to refer or not refer students for special education. Among the internal factors cited were organizational factors, the competence of professional personnel, and the availability of services. Among the external factors influencing referral decisions were outside agency influences, the socio-political climate, federal or state requirements, and parental pressure.

Shinn, Tindal, and Spira (1987) suggested that decisions to refer or not refer students might be influenced by the economics of teacher resources. Regular education teachers who want to provide appropriate instruction to students with problems often find that they require additional teaching resources (time, materials, consultation, etc.) but can not get them. The alternative is a referral for special education.

Algozzine and Ysseldyke (1981), discussing the results of their study in which 51 percent of their participants indicated that a normal "student" was eligible for special education, noted that educators may be reacting to the ills of regular education and adopting a "better safe than sorry" attitude with regard to special education services.

Knitzer, Steinberg, and Fleisch (1990) noted the great variability among states' reported prevalence rates for behaviorally and emotionally disturbed and disordered (BED) children, ranging from 0.09 percent in Arizona to 2.48 percent in Utah, as well as the great variability among districts within states. They believed that local norms and tolerance for deviant behavior influence whether a child is identified as BED.

They reported that teachers in some places are reluctant to identify students as BED because they fear the stigma attached to the label. Some avoid the more stigmatizing label in favor of "learning disability." The formal label used does seem to make a difference in prevalence rates. In a survey of states requesting information on labels used for BED, they found that the 20 states using the term "seriously emotionally disturbed" had an average BED prevalence rate of 0.68 percent while the 27 states not including the word "seriously" had an average prevalence rate of 1.14 percent.

Solutions to Gender Disparity and Other Problems

The following solutions and advice were offered by authors whose works were reviewed. Although all suggestions are only presented in summary form here, three of the works gave some details as to how their suggestions might be applied. The three are: The Council of Chief State Schools Officers' Resource Center on Sex Equity (CCSSO 1983), Hollingsworth and Mastroberti (1983), and Knitzer, Steinberg, and Fleisch (1990).

Few of the sources provided rationales for their suggestions or evidence that they would work. An exception was Knitzer, Steinberg, and Fleisch (1990) whose extensive coverage of the literature included a number of field trial studies.

Most of these suggestions were based on beliefs that gender disparities are caused either by sex bias on the part of those who refer children for special education, by flaws in the identification and referral process, or by programs which do not adequately serve girls who have disabilities. Only one writer, Rossi (1972), based his suggestions on the notion that biological causes were involved in the gender disparities observed.

Suggestions fall into four main categories. They are to: reduce sex bias and stereotyping, improve special education referral and identification, improve the quality of special education services, and conduct research.

While certain recommendations were made specifically to state officers and agencies, it is assumed that people at local, state, and national levels could be the intended implementors or facilitators of such suggestions, so no references to specific actors are made here.

1. Develop a written policy on sex equity, including special education. (A rationale was given.) (CCSSO, 1983)

2. Collect data by sex and by race on enrollment, placement, services provided, etc. (CCSSO, 1983)

3. Do (or sponsor) research on gender issues.

   a. Identification and referral, parents' and society's differential expectations for boys and girls, differential provision of services, differential placement. (CCSSO, 1983)

   b. Teacher and school characteristics as well as student characteristics. (Ysseldyke, Christenson, and others, 1982)

4. Include a component in the state monitoring plan and on-site review procedures which targets sex equity criteria. (CCSSO, 1983)

5. Provide inservice training which:

   a. Raises awareness of the effects of sex bias, stereotyping, and discrimination. (CCSSO, 1983)

   b. Decreases labeling children (Drabman, et al., 1987) (Kedar-Voivodas, 1983)

   c. Improves teachers expectations about boys' skill levels. (Drabman, et al.,1987)

   d. Results in ecological approach to misbehavior and skills in changing behavior. (Ysseldyke, Christenson, et al., 1982)

   e. De-mystifies behavioral or emotional disturbance for board members and regular education teachers. (Knitzer, et al,1990)

6. Disseminate information about sex equity and model programs (resources are cited). (CCSSO, 1983)

7. Improve pre-referral strategies and practices:

   a. Examine the interaction between the troubled student and the educational setting. (Ysseldyke, Christenson, et al., 1982)

   b. Place difficult students with more tolerant regular education teachers. (Ysseldyke, Christenson, et al., 1982)

   c. Make alternative intervention strategies available. (Knitzer, et al.,1990)

d. Re-allocate school resources; change the duties of special education staff to include more cooperative planning of pre-referral strategies, less testing. (Knitzer, et al.,1990)

e. Use M-team members as consultants for planning interventions other than referral to special education. (Ysseldyke, Christenson, et al., 1982)

f. Make sure the pre-referral strategies are appropriate and powerful enough to benefit the student. (Knitzer, et al.,1990)

8. Improve the referral process by changing regular education teachers' attitudes about the purposes of referral and requiring clearly-stated reasons for referral. (Ysseldyke, Christenson, et al., 1982)

9. Improve the identification process and individual educational programs (IEPs)

a. Have all ED and LD children examined for neurological lags, give medications if appropriate. (Rossi, 1972)

b. Prevent inappropriate identification of children regarding behavioral and emotional disabilities. (Knitzer, et al.,1990)

10. Improve special education program quality

a. Knitzer and her colleagues make ten recommendations for improving the quality of special education. None is specifically aimed at reducing gender disparities. However, it is implied that if their recommendations were implemented, special education programs would serve girls' needs better and more girls would be referred. (Knitzer, et al.,1990)

b. Provide or improve comprehensive vocational/ rehabilitative programs for girls with disabilities. (Hollingsworth and Mastroberti 1983)

Incidentally, Knitzer, Steinberg, and Fleisch (1990) reported that Harris and Huneycutt (1987) found that pre-referral intervention strategies reduced the disproportionate referrals of males to special education (p. 42) and the "the gender bias so prevalent in special education all but vanished with the pre-referral process" (p. 58). An examination of Harris and Huneycutt's report (1987) revealed that the male to female ratios were 3.7:1 for pre-referral, 3.8:1 for special education referral, and 5.2:1 for M-team verification. Thus, the gender bias or disparity did not disappear at all as a result of pre-referral intervention. In fact, of 234 males for whom pre-referral strategies were used, 73 were eventually verified by M-teams (31 percent), while 14 of 63 females receiving pre-referral interventions were later verified (22 percent). The misinterpretation of findings probably resulted from some lack of clarity regarding percentage values in Harris and Huneycutt's table.

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Fifty States' Special Education Prevalence Rates and Gender Disparities: Predictions Based On Demographics

Background

There is great interest both in the percentage of all children who are enrolled and served in special education (the prevalence rate) and in the disparity between the numbers of males and females in certain special education program areas.

In the literature review, evidence was found which suggested that states' demographic characteristics and prevalence rates might be related to their male percentages in the special education areas of interest, so this study was enlarged to examine prevalence rates as well as gender disparities.

Prevalence Rates in Wisconsin

In recent years, the numbers of Wisconsin children in special education programs have increased at higher rates than the total enrollments of Wisconsin students. That is, our prevalence rates have increased. Legislators, taxpayers, and educators alike are concerned with these increases. But is Wisconsin different from other states? It is useful to compare Wisconsin with other states to see whether we differ from the other states and, if so, to learn why.

The Office of Special Education Programs (1990) reported prevalence rates for ten specific disabilities, and for all disabilities combined, for all 50 states. Wisconsin ranked 47th from the top for prevalence in all areas combined, 10th for emotional disturbance (ED), 46th for learning disabilities (LD), and 45th for speech and language impairments (SL).

Only Louisiana, Georgia and Hawaii have lower overall prevalence rates than that of Wisconsin. Figure 12 gives the prevalence rates for all 50 states and the District of Columbia. The District of Colombia was found to be an extreme outlier in several characteristics and was excluded from the following analyses.

Wisconsin Disparities Between Males and Females

For some years, there have been considerably more males than females in Wisconsin's ED, LD, and SL programs. In 1984, for example, of those children whose primary handicapping condition was ED, about 80 percent were males and 20 percent were females. The LD male percentage was about 73 percent and that for SL was about 64 percent. The 1984 values will be used in order to compare Wisconsin with the other states. More recent Wisconsin values are about the same.

Similar disparities exist in most other states. Nationally, the average 1984 male percentages (the most recent state data available) were 78 percent males in ED, 71 percent males in LD, and 63 percent males in SL. Among the 50 states, Wisconsin ranked 19th from the top in ED male percentage, 10th in LD, and 13th in SL. However, note that Wisconsin's male percentages exceeded the means of the 50 states by only 1.3 percent in ED, 2.5 percent in LD, and 1.0 percent in SL (see Figure 11). Thus, Wisconsin's male

percentages in these three disability areas are not markedly different from those of other states, although they are consistently on the high side. Recall also that Wisconsin's prevalence rates tend to be lower that those of other states, except in ED.

The Influence of State Demographic Characteristics

It would be useful to know what factors may have caused Wisconsin's and other states' rankings to be high, medium, or low. If the causal factors are understood and their potency assessed, it should be easier to make changes.

A decision was made to examine the relationships among various state demographic characteristics, prevalence rates, and their percentages of males in ED, LD, and SL when it was learned that New Jersey's Department of Education had done a similar study within its own boundaries (Molenaar, 1991). New Jersey counties' prevalence rates were related to their population sizes and percentages of blacks. If demographic differences among counties within a state were related to special education variables, analyses of data among all 50 states might show similar relationships.

Figure 11 gives the descriptive statistics for each of the variables used in this study for the 50 states as a group, as well as Wisconsin's raw value and rank among the 50 states.

Theory

It seemed likely that states' demographic characteristics would have an influence on their ED, LD, and SL prevalence rates, and might also have an influence on their male percentages in ED, LD, and SL. It also seemed likely that prevalence rates would have an influence on male percentages.

However, the possibility exists that states' male percentages influence prevalence rates and not the other way around. In some preliminary correlation analyses, a revealing pattern was seen. In two disability areas, the correlations between the 50 states' male percentages and prevalence rates were quite large and were negative; they were LD ($r = -.46$) and SL ($r = -.37$).[1] For example, the higher a state's LD prevalence rate, the lower its LD male percentage or, in other words, the higher its LD female percentage. The correlation between ED prevalence rates and male percentages was in the same direction ($r = -.22$), but was not significantly different from zero ($P = .13$). (See Figure 10 for the matrix of correlations among all pairs of variables used in this study.)

When one has only correlational data, it is often difficult to determine the direction of causality between two correlated variables. One very bothersome fact was that while state prevalence rates were for 1989, the most recent male and female percentages were for 1984. As a result, it was necessary to try to predict or account for differences among states' male percentages in 1984 on the basis of their prevalence rates five years later.

Because the direction of casualty between states' prevalence rates and their male percentages was not clear, each was examined as a potential predictor (or explanatory variable) of the other. The prevalence rates are difficult to conceptualize as predictors, since they had to "predict" five years into the past.

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[1] Correlations coefficients are indexes of relationship between two measurable characteristics. Values of r, the index, can range from -1.00 to +1.00. A value near zero means no relationship. A positive value of r indicates that the higher the values of one variable, the higher the values of the other variable. A negative sign indicates that the higher the values of one variable, the lower the values of the other. Values of r are not intuitively meaningful in themselves. A more meaningful index is r^2 (the square of r); it represents the percentage of variation in one variable that is "accounted for" by the other.

Is Wisconsin In Or Out of Line With Other States?

The general hypothesis that prompted the present exploratory study is as follows: "The high proportions of males in Wisconsin's ED, LD, and SL programs are due to certain events or conditions which are, to some degree, different in Wisconsin from those in other states." No information existed regarding any such events or conditions. The hypothesis was one of many that were generated to exhaust all possible explanations of the gender disparities that were observed.

Objectives of this Study

- To determine which state demographic characteristics and which male percentages are related to prevalence rates in ED, LD, and SL.
- To determine what proportions of variation among the 50 states' prevalence rates are due to demographic characteristics, due to male percentages, and due to other factors.
- To determine whether Wisconsin's prevalence rates are in line with or out of line with those of other states when demographic characteristics and male percentages are taken into account.
- To determine which state demographic characteristics and which prevalence rates are related to states' male percentage rates in ED, LD, and SL.
- To determine what proportions of variation among the 50 states' male percentages for ED, LD, and SL are due to demographic characteristics, due to prevalence rates, and due to other factors.
- To determine whether Wisconsin's male percentages in ED, LD, and SL are in line with or out of line with those of other states when demographic characteristics and prevalence rates are taken into account. This was the specific issue that prompted the study.

Procedures

Variables and Values Defined.

Prevalence Rates As described above, the 1988-89 prevalence rates for all handicapping conditions combined and for all specific areas of handicap, for all 50 states, were published by the U.S. Department of Education's Office of Special Education Programs (the 12th Annual Report to Congress of the Implementation of the Education of the Handicapped Act, 1990, Table AA23, pages A-46, A-47). These data are presented in Figure 12 of the present report. Values used here are for ED, LD, SL, and all areas combined.

Prevalence is defined as the unduplicated count of children in special education divided by the total number of children in the population. The Department of Education uses the unduplicated count of special education children, ages 6-21, as the numerator of the fraction and uses the U.S. Bureau of the Census' estimates of each state's total population, ages 6-21, as the denominator.

Male Percentages in ED, LD, and SL The U.S. Department of Education's Office of Civil Rights (O.C.R.) estimates the numbers and percentages of males and females in each area of special education every two years. The most recent data available were for 1984 (DBS Corp., 1986).

The O.C.R. draws a stratified random sample of each state's school districts. For example, there were 98 districts sampled from Wisconsin in 1984. Survey forms sent to schools cover, among other things, the child counts in all areas of primary handicap with break-outs by gender.

Note that the two sets of variables above, prevalence rates and male percentages, were used as outcome variables in the analyses and were also used to predict each other. All of the following six demographic variables are predictors exclusively.

Total Population The states' total populations, according to the 1980 census, were reported in The World Almanac and Book of Facts, 1991, Mark S. Hoffman, Editor, New York: Pharos Books, 1990.

Population Density States' people per square mile in 1980 (World Almanac).

Per Capita Income States' income per person in 1989 (World Almanac).

Alcohol Consumption Alcohol consumption in gallons per person per year for each state is estimated annually by the National Institute on Alcohol and Drug Abuse, based on states' alcoholic beverage tax receipts. Data for 1988 were provided by Michael Quirke of the Wisconsin Department of Health and Social Services. Since Wisconsin ranks among the states with the highest rate of alcohol consumption, this predictor was of particular interest.

School Children Percent Black The O.C.R. estimates each state's percentage of school age children by racial category. These data are for 1984. Since the New Jersey study found relationships between the percentage of Blacks in the population and certain special education variables, this variable was examined in the present study (DBS Corp., 1986).

School Children Percent Minority Again, the source was the Office of Civil Rights and the data were for 1984 (DBS Corp., 1986).

To summarize, four state prevalence rates were examined both as outcome variables and as potential predictors of the 50 states' male percentages. Their definitions and shorthand labels, which we will use subsequently, are as follows:

TOTPREV = U.S. Department of Education state prevalence rate for all handicap areas combined, 1988-89.
EDPREV = Emotional disturbance prevalence rate, 1988-89.
LDPREV = Learning disabilities prevalence rate, 1988-89.
SLPREV = Speech and language prevalence rate, 1988-89.

Three state male percentage variables were examined both as outcome variables and as potential predictors of the 50 states' prevalence rates. Their labels and definitions are as follows:

EDMALE% = Percentage of the state's special education children whose primary disability was emotional disturbance who were males, 1984.
LDMALE% = Percentage of learning disability males, 1984.
SLMALE% = Percentage of speech and language males, 1984.

The following six state demographic variables were used as predictors. Their labels and definitions are as follows:

POPTOTAL = State total population, according to the 1980 census.
DENSITY = People per square mile in 1980.
INCOME = Per capita income in 1989.
ALCOHOL = Estimated per capita alcohol consumption, 1986.
PCTBLACK = Percent school age children who were Black, 1984.
PCTMINOR = Percent school age children who were minority group members, 1984.

Statistical Analyses

A correlational procedure called multiple regression was used. A rather complete explanation of the procedure is provided here. The procedure uses specific operational rules and calculations to select that combination of predictor variables, from among those provided by the investigator, which best "accounts for" differences among the 50 states' values with regard to each outcome variable specified by the investigator.

While there are a number of different regression procedures available, one called STEPWISE regression was used. It proceeds one step at a time and provides several pieces of information at each step. In the first step, the procedure usually selects the best predictor variable from among the potential predictors specified by the investigator. That first predictor is usually the one predictor which is most highly correlated with the outcome variable.

In subsequent steps, it adds other predictors that account for an appreciable additional amount of variation in the outcome variable.

Because predictors may, themselves, be inter-related, a variable that is added to the prediction model after the first step may add but little to the predictive power of the model. Further, there may be predictors which correlate with the outcome variable but are not included in the model because they contribute nothing new to the predictive power of the model.

Perhaps the most useful piece of information provided by the regression procedure is called "R-squared." It is the square of the multiple correlation coefficient (i.e., R) between the combined predictor variables and the outcome variable. R-squared is equal to the proportion or percentage of variation in the outcome variable (that is, differences among states' prevalence rates or male percentages) that is accounted for by the combination of predictors in the final predictor model.

Note that the proportion of variation in the outcome variable not accounted for in the final model (that is, one minus R-squared) must be due to other factors than the potential predictors.

Another useful index is the "partial R-squared" value for each of the predictors present in the final model. A predictor's partial R-squared value represents the percentage of variation in the outcome variable that is uniquely accounted for by that predictor and reflects its contribution to the total predictive power of the final model. Such information helps to develop or to revise theoretical explanations of the causes of variation in the outcome variable.

Finally, the analysis provides numeric values which may be directly used to generate predicted values of the outcome variable for each case (i.e., each state). The investigator simply uses the actual predictor values for each case and plugs them into the equation or formula.

These coefficients were used to generate predicted values of the seven outcome variables for each state. For example, the equation used to predict each state's total prevalence rates is given below. The symbol * stands for multiplication.

TOTPREV = 30.012 + (0.002553 * DENSITY) + (0.02273 * PCTBLACK)
- (0.02563 * PCTMINOR) - (0.3573 * SLMALE%).

Wisconsin's predicted value of TOTPREV was calculated by inserting Wisconsin's raw values for the four predictors (from Figure 11) in the appropriate places in the equation, as follows:

TOTPREV = 30.012 + (0.002553 * 87) + (0.02273 * 7.7) - (0.02563 * 11.3) - (0.3573 * 64.1).

If we carry out the multiplication within the parentheses, we get the following predicted value of TOTPREV for Wisconsin:

TOTPREV = 30.012 + .22211 + .17502 - .28962 - 22.9020 = 7.217%

As can be seen in Figure 1 for TOTPREV, the symbol representing Wisconsin is directly above 7.2 percent on the horizontal scale for predicted values of total prevalence rates.

Scatter Plots of States' Predicted and Actual Values:

Seven scatters, one for each outcome variable, were computer-generated with predicted values on the horizontal axis and actual values on the vertical axis. A state's location in the scatter (indicated by the letter "A") was determined by its predicted and actual values for the particular outcome variable involved.

Three diagonal lines were drawn on each plot. One ran through all the points where the predicted and actual values were equal. The second line was parallel to the first and slightly above it. The vertical distance between the first and second lines was equal to the standard deviation of the distribution of actual values for the outcome variable. The third line was parallel to and one standard deviation below the middle line.

The closer an "A" is to the middle line, the more closely that state's actual outcome value approximated its predicted value. The farther above or below the middle line an "A" is located, the more likely that state's actual outcome value is influenced by factors other than those which were used as potential predictors.

For each plot, Wisconsin's location is indicated by the letter "W". From its position in the scatter, one can see whether Wisconsin is in line or out of line with the other states, when the predictors used are taken into account. Its distance above or below the middle diagonal line (in standard deviation units) reflects the likelihood that Wisconsin's actual outcome value is influenced by factors other than those used as potential predictors in this study.

There is a more understandable (if less precise) index of whether Wisconsin is in line or out of line with the other states, when the influences of our predictor variables have been accounted for. It is simply the difference between Wisconsin's actual and predicted ranks for each outcome variable.

Wisconsin's actual rank on each variable was already known. To find our predicted rank, a vertical line was drawn through the letter W, representing Wisconsin in the scatter. A count of the number of states located to the right of this line plus one gave Wisconsin's predicted rank.

Results

Regression results and scatter plot results will be presented one outcome variable at a time. Then the regression analysis results will be summarized for the prevalence outcome variables and for the male percentages.

State's Total Prevalence Rates (TOTPREV)

Regression Results Nine variables were specified as potential predictors for all four prevalence outcome variables. They were: POPTOTAL, DENSITY, INCOME, ALCOHOL, PCTBLACK, PCTMINOR, EDMALE%, LDMALE%, and SLMALE%.

— Four of the nine potential predictors were included in the final prediction model FOR TOTPREV. They (and their partial R-squared values) were: DENSITY (.169), SLMALE% (.156), PCTMINOR (.063), and PCTBLACK (.045).

— As a group, these four predictors accounted for 43 percent of the variation among states' total prevalence rates. That is, R-squared was .43. Thus, 57 percent of that variation is due to other factors than those which were studied.

— DENSITY and PCTBLACK were positively correlated with TOTPREV. PCTMINOR and SLMALE% were negatively correlated with TOTPREV.

— An inspection of the raw correlation coefficients between TOTPREV and these four predictors revealed that all were significantly different from zero except for the correlation between TOTPREV and PCTBLACK (r = -.009, P = .95).

It is not clear why PCTBLACK appeared in the regression model. In any case, PCTBLACK only barely got into the model and its contribution to the explained variation among states' values of TOTPREV is small.

Scatter Plot Results (Figure 1) In each of the seven scatters, the horizontal axis represents predicted values of the outcome variable and the vertical axis represents actual values. In each scatter, the letter "A" represents the location of one state, with coordinates equal to its predicted and actual outcome values. The letter "B" represents two states that happened to share the same coordinates.

In each scatter, Wisconsin's location is indicated by the letter "W." The letter "A" for Wisconsin had appeared in that exact location and was replaced with a "W" by the investigator on the computer-generated plot while it was still in electronic form.

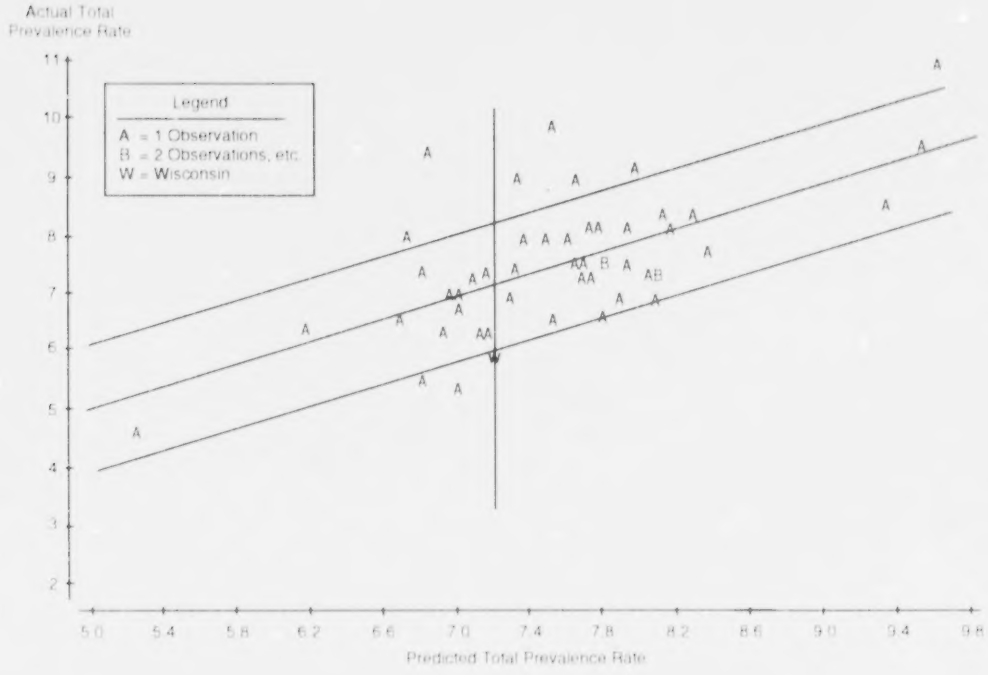
— The scatter in Figure 1 is tilted and shaped like a football, but is slightly thinner in the middle. Since R-squared = .43, the value of R (i.e., the correlation between predicted and actual values of TOTPREV) is .66. Most states are fairly close to the middle diagonal line, where the predicted and actual values are equal.

— However, the elongated shape of the scatter is mostly due to the presence of one state (Hawaii) at the lower left and three states at the upper right (the one at the far upper right is Massachusetts). The scatter formed by the remaining 46 states is not nearly as elongated. This indicates that the regression process has been influenced by predictor values for these four states and that if all or several of the four were excluded from the analysis of TOTPREV, a somewhat different combination of predictors may have emerged.

For example, Hawaii, not surprisingly, has many "minority" members among its school age children (77 percent). Because Hawaii's value of PCTMINOR is so large (more than three standard deviations above the mean of 23.5 percent for all states), it exerts a great influence on PCTMINOR as a predictor. If, as is sometimes done, Hawaii had been excluded because it is such an extreme outlier, PCTMINOR would probably have not appeared in the prediction model at all.

— Wisconsin's location in the scatter for TOTPREV is slightly more than one standard deviation (vertically) below the middle line. Wisconsin's predicted rank for TOTPREV was 34th and its actual rank was 47th out of the 50 states. Although there are some states that stray farther from the middle line, Wisconsin does appear to be out of line with most of the other 49 states. Our total prevalence rate is low. This indicates that certain factors not represented by the nine potential predictors used are at work in Wisconsin and depress our overall prevalence rate somewhat.

Figure 1: Predicted and Actual Total Prevalence Rates of 50 States



Emotional Disturbance Prevalence (EDPREV)

Regression Results

— Three predictors made up the final prediction model for EDPREV. They (and their partial R-squares) were: INCOME (.178), PCTMINOR (.037), and EDMALE% (.037). Obviously, INCOME is the key factor here.

— In combination, they accounted for 25 percent of the total variation among states' EDPREV rates. That is, R-squared was .25. Of the four prevalence rate variables, EDPREV had the smallest value of R-squared and is the prevalence rate least well accounted for by the predictors that were used.

A relatively large proportion of the variation among states' EDPREV values (75 percent) is due to factors other than these predictors variables. The other factors may include such things as: varying definitions of ED from state to state, the availability of college and university ED courses, and differences in the maximum numbers of students per ED teacher allowed.

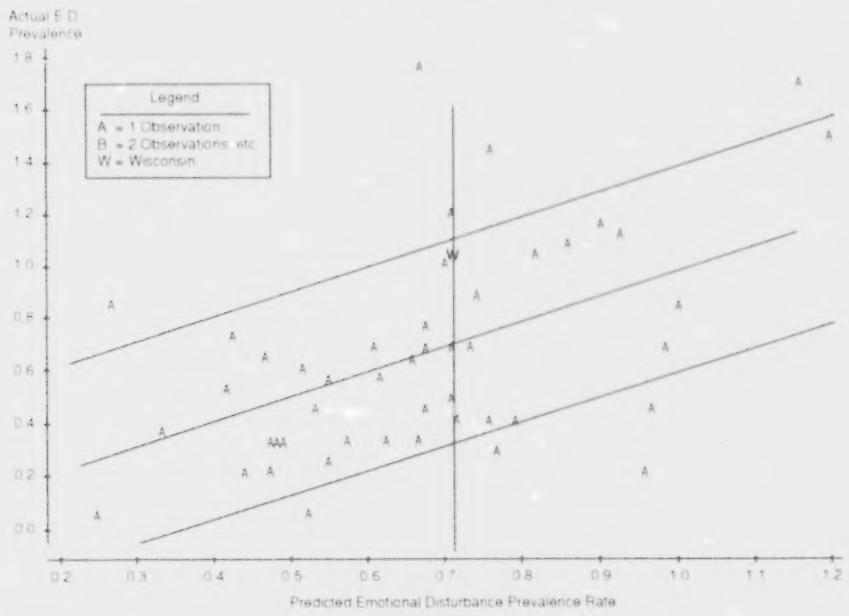
— EDPREV was positively correlated with INCOME and negatively correlated with both PCTMINOR and EDMALE%. The correlation between EDPREV and INCOME was remarkably high (r = .422), the highest of any variable's correlations with EDPREV. Note that, although DENSITY had the second highest correlation with EDPREV (r = .326), it was not in the prediction model because the correlation between DENSITY and INCOME was so high (r = .669) that DENSITY didn't add anything to the prediction model that wasn't already provided by INCOME.

Scatter Plot Results (Figure 2)

— The general shape of the plot of predicted and actual EDPREV values is obviously more rounded than that for TOTPREV. As mentioned above, EDPREV is not well predicted. R-squared was only .25.

— The W for Wisconsin is located slightly less than one standard deviation above the middle diagonal line. Our predicted rank was 17th and our actual rank was 10th out of the 50 states. This difference is not as great as that for TOTPREV.

Figure 2: Predicted and Actual Emotional Disturbance Prevalence Rates of 50 States



Learning Disabilities Prevalence (LDPREV)

Regression Results

— Two predictors made up the final model: LDMALE% (partial R-squared = .215) and DENSITY (.127).

— These two variables accounted for 34 percent of the total variation among states' LDPREV rates (R-squared = .34). Thus, 66 percent of all variation in LDPREV is due to factors not represented by these predictors.

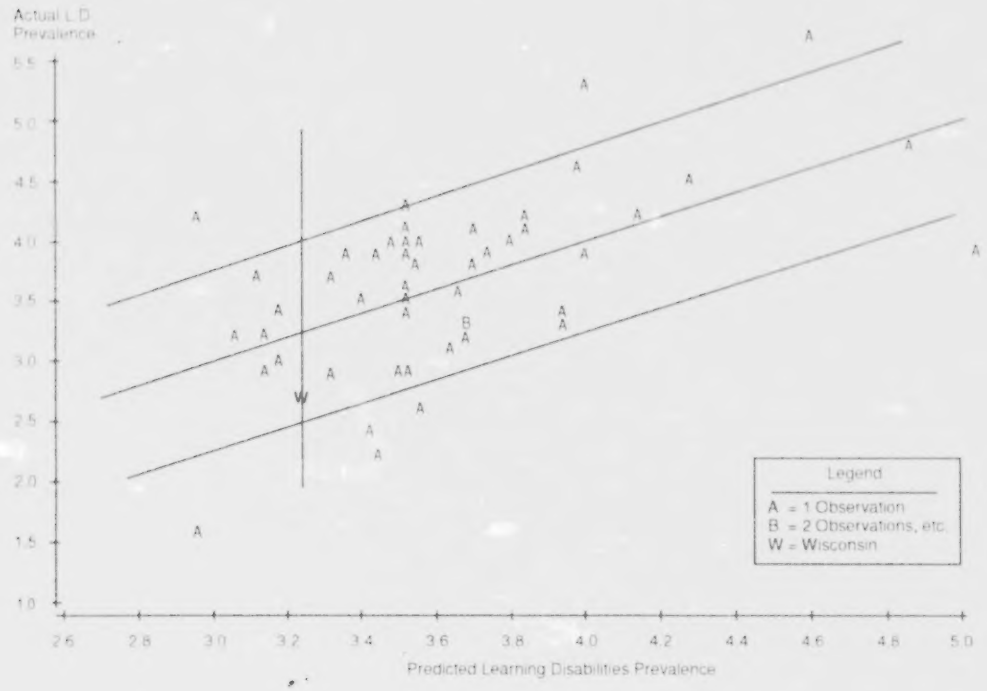
— LDPREV was correlated positively with DENSITY but negatively with LDMALE%.

Scatter Plot Results (Figure 3)

— The general shape of the scatter in Figure 3 is somewhere between those in Figures 1 and 2, and its value of R-squared is midway between those for TOTPREV and EDPREV.

— Wisconsin's position is about three-quarters of an SD below the middle line. Our predicted rank (42nd) was close to our actual rank (46th).

Figure 3: Predicted and Actual Learning Disabilities Prevalence Rates of 50 States



Speech and Language Prevalence (SLPREV)

Regression Results

— Four predictors were involved. They and their partial R-squared values were: SLMALE% (.137), PCTBLACK (.069), EDMALE% (.039), and DENSITY (.037). The last two are obviously minor contributors to the predictive power of the model.

— As a group, they accounted for 28 percent of all differences among states' values of SLPREV (R-squared was .28). Thus 72 percent of the variation in SLPREV is due to factors not used as potential predictors in this study.

— SLPREV correlated positively with PCTBLACK, EDMALE% and DENSITY, but correlated negatively with SLMALE%.

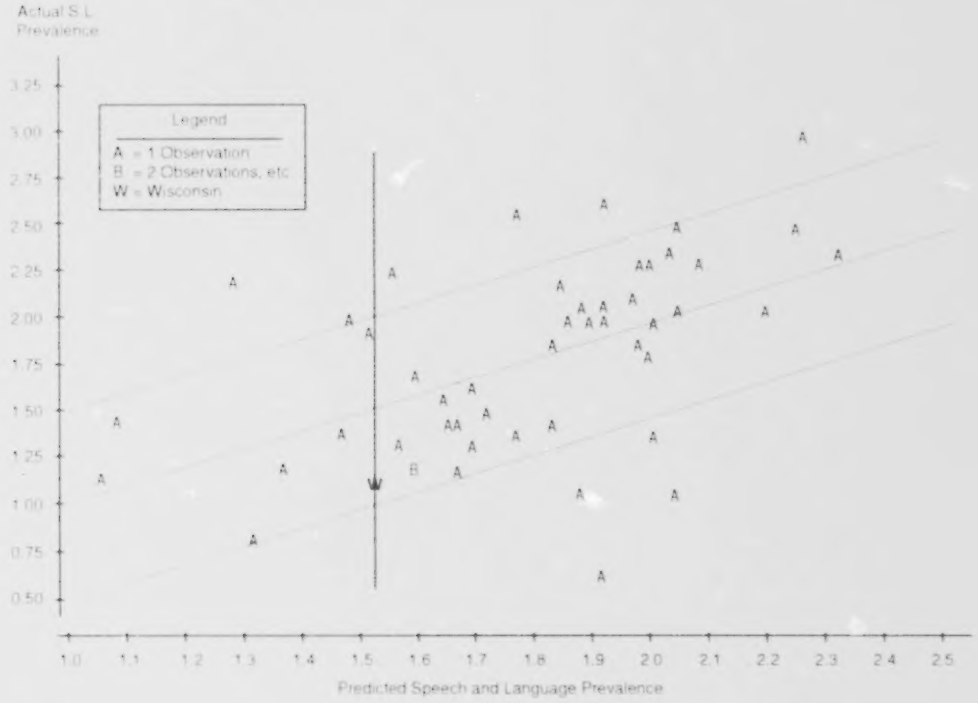
— Three of the four predictors in the final model for SLPREV (i.e., DENSITY, PCTBLACK, and SLMALE%) were also in the final model for TOTPREV. Most likely this is because SLPREV and TOTPREV are so highly correlated (r = .636).

Scatter Plot Results (Figure 4)

— The scatter is shaped somewhat like that for EDPREV in Figure 2. The value of R-squared for SLPREV was .28 while that for EDPREV was .25.

— Wisconsin's location is about three-quarters of an SD below the middle diagonal line. Its predicted rank for SLPREV was 42nd among the 50 states and its actual rank was 45th. Again, these ranks are quite close.

Figure 4: Predicted and Actual Speech and Language Prevalence Rates of 50 States



ED Male Percentage (EDMALE%)

In the regression analyses of the three male percentages (ED, LD, and SL), ten variables were used as potential predictors. They were: POPTOTAL, DENSITY, INCOME, ALCOHOL, PCTBLACK, PCTMINOR, TOTPREV, EDPREV, LDPREV, and SLPREV.

Regression Results

— Only two predictors of EDMALE% were found. They and their values of partial R-squared were: POPTOTAL (.055) and EDPREV (.044).

— Together, they accounted for only 10 percent of the total variation among states' values of EDMALE% (R-squared = .10). Thus 90 percent of the variations among states' EDMALE% values is due to factors not represented by the potential predictors used.

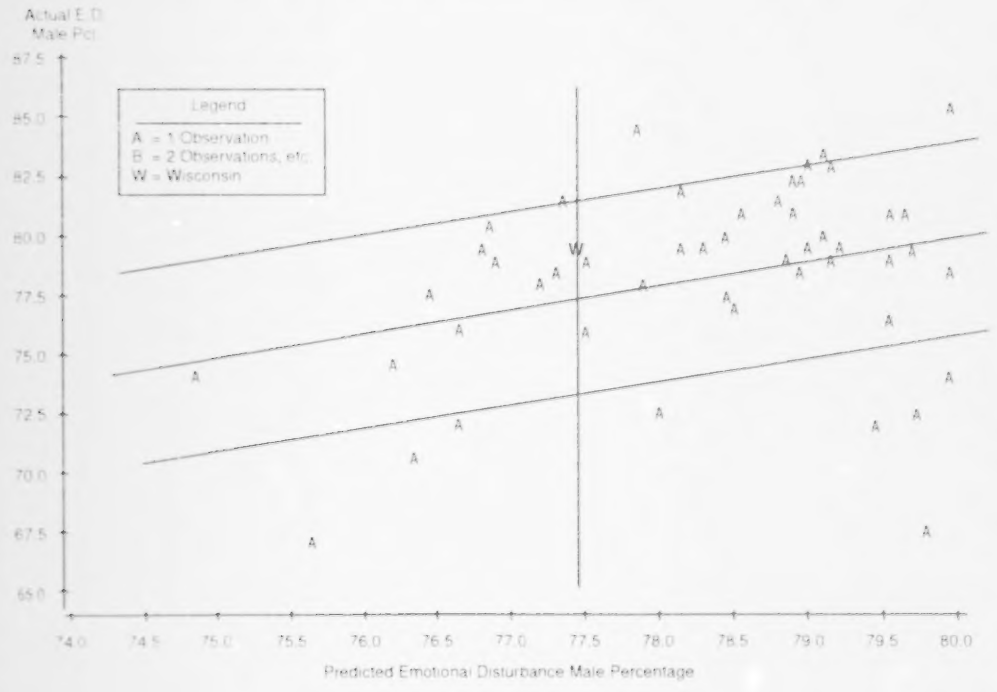
— EDMALE% was negatively correlated with both POPTOTAL (r = -.234) and EDPREV (r = -.218), but, with an N of only 50 cases, neither of these correlations was significantly different from zero.

Scatter Plot Results (Figure 5)

— The scatter is rather widely dispersed above and below the middle diagonal line. Note also that the predicted values only range from 75 percent to 80 percent, while the actual EDMALE% values range from 67 percent to 85 percent. This problem, which occurs when predictors are weak, is called "regression to the mean." It indicates that many states' values of EDMALE% are influenced by events or conditions unique to those states or that other, general, state factors not reflected by these predictors are at work.

— Wisconsin's position is about one-half of an SD above the middle diagonal line. Its predicted rank (which is of uncertain meaning, since R-squared is so low) was 37th out of the 50 states, and its actual EDMALE% rank was 19th.

Figure 5: Predicted and Actual Emotional Disturbance Male Percentages of 50 States



LD Male Percentage (LDMALE%)

Regression Results

— Two predictors were found: PCTBLACK (partial R-squared = .241) and LDPREV (.131).

— Together, they accounted for 37 percent of all differences among states' LD male percentages. Thus, 63 percent of those differences are not accounted for by the predictors and must be due to other factors.

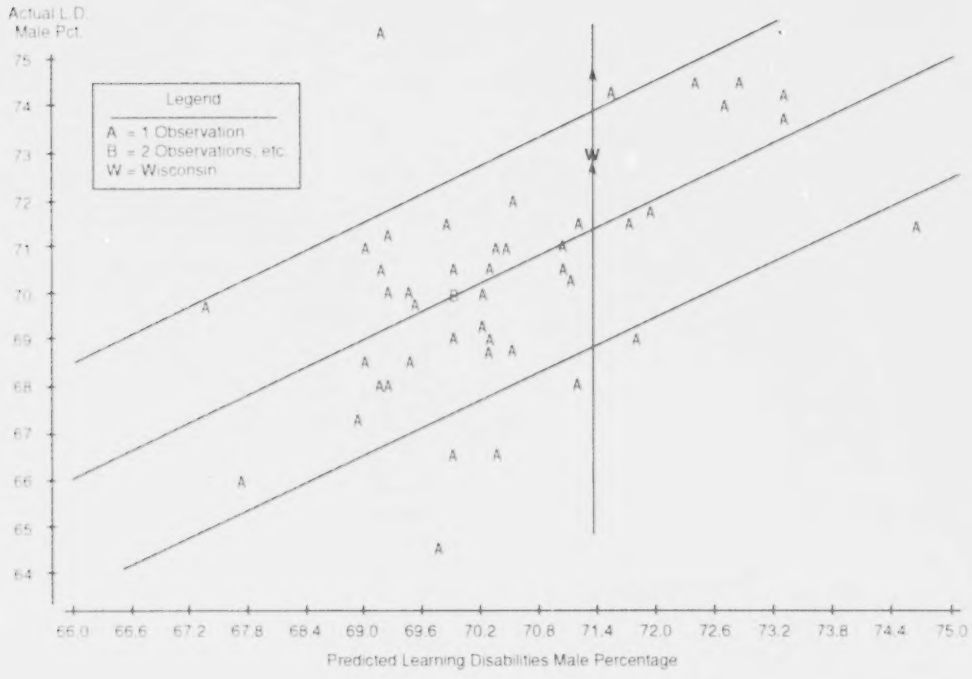
— LDMALE% was positively correlated with PCTBLACK, but negatively correlated with LDPREV.

Scatter Plot Results (Figure 6)

— While there are a few strays, most states' positions are quite near the middle diagonal line.

— Wisconsin's location is about 3/5 of an SD above the middle line. Its predicted rank on LDMALE% was 13th and its actual rank was 10th.

Figure 6: Predicted and Actual Learning Disabilities Male Percentages of 50 States



SL Male Percentage (SLMALE%)

Regression Results

— Five predictors contributed to the final model. The first two (SLPREV and PCTBLACK) were the major contributors. The five and their partial R-squares were: SLPREV (.137), PCTBLACK (.120), LDPREV (.054), DENSITY (.048), and EDPREV (.044).

— R-squared = .40. That is, the five predictors accounted for 40 percent of all differences among states' percentages of males in SL. Thus, 60 percent of those differences are due to other factors.

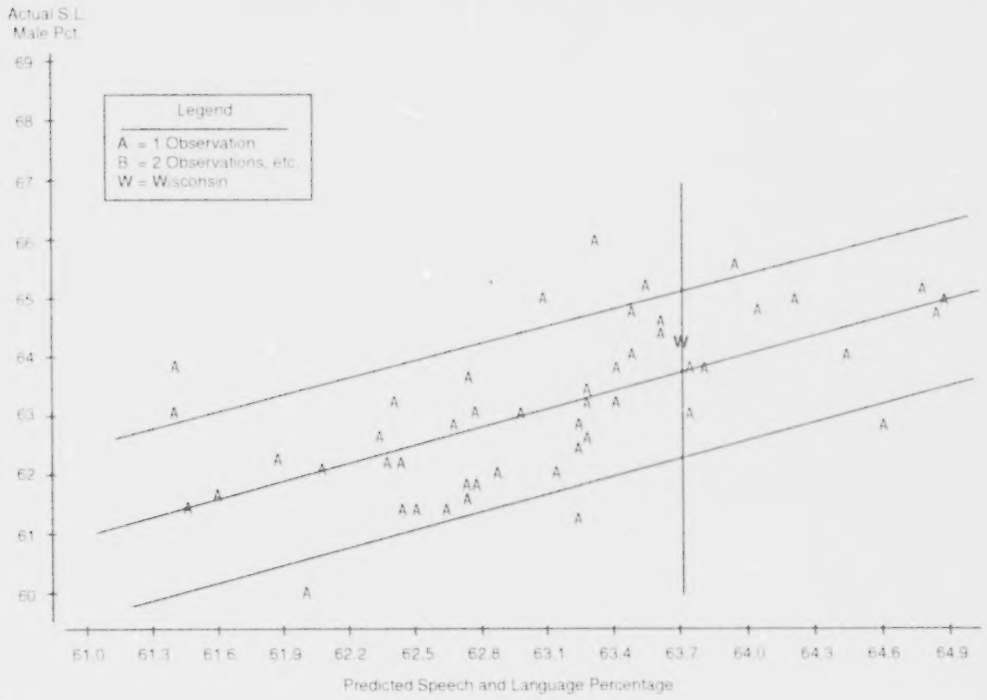
— SLMALE% was positively correlated with PCTBLACK and DENSITY, but negatively correlated with SLPREV, LDPREV, and EDPREV.

Scatter Plot Results (Figure 7)

— The states' actual values for SLMALE% tend to be fairly close to their predicted values.

— Wisconsin's location is about one-third of an SD above the middle line. Its predicted rank on SLMALE% was 12th and its actual rank was 13th.

Figure 7: Predicted and Actual Speech and Language Male Percentages of 50 States



Summary of Regression Results for Prevalence Rates

The prediction models for states' total, ED, LD, and SL prevalence rates are summarized in the four columns of Figure 8. For each predictor variable which appeared in the final model of each outcome variable, the sign (positive or negative) of the underlying correlation is given, as is the predictor's partial R-squared value. Total R-squared values for the model are given at the bottom of the column for that model. The following observations can be made:

- Of the four state prevalence rates studied, TOTPREV was best predicted by these predictor variables. EDPREV was least well predicted.
- TOTPREV and SLPREV were predicted with quite similar models. They shared three predictor variables (DENSITY, PCTBLACK, and SLMALE%).
- There were negative signs for EDMALE% as a predictor of EDPREV, for LDMALE% as a predictor of LDPREV, and for SLMALE% as a predictor of SLPREV. Thus, the higher the percentage of males in a state's ED, LD, or SL program, the lower the prevalence rate in that program. This relationship was greatest for LD and least for ED.
- Prior to the regression analyses reported here, similar analyses were run using only the states' demographic characteristics (i.e., omitting the various male percentages) as predictors of prevalence rates. The total R-squared values for the various models were: TOTPREV (.26), EDPREV (.22), LDPREV (.29), and SLPREV (.05). Adding the male percentages as predictors contributed greatly to the variance explained for TOTPREV and for SLPREV, but contributed only marginally to the models for EDPREV and LDPREV.
- DENSITY showed up in all prediction models except that for EDPREV. INCOME showed up only in the model for EDPREV. This was despite the fact that both DENSITY and INCOME had significant correlations with TOTPREV, EDPREV, and SLPREV. The reason only one of the two (DENSITY or INCOME) showed up in any model is that they are, themselves, highly intercorrelated (r = .669).

Thus, if a predictor does not appear in a model, it doesn't mean that it is unrelated to the outcome variable. It only means that other variables in the model predict the outcome variable just as well or better without it.

Figure 8: Signs of Correlations and Values of Partial R-Squared for Variables Present in Four Prediction Models of States' Prevalence Rates

PREDICTOR	ALL CONDITIONS	EMOTIONAL DISTURBANCE	LEARNING DISABILITY	SPEECH/ LANGUAGE
POPTOTAL				
DENSITY	pos .169		pos .127	pos .037
INCOME		pos .178		
ALCOHOL				
PCTBLACK	pos .045			pos .069
PCTMINOR	neg .063	neg .037		
EDMALE%		neg .037		pos .039
LDMALE%			neg .215	
SLMALE%	neg .156			neg .137
TOTAL R-Squared	.43	.25	.34	.28

Summary of Regression Results for States' Male Percentages

The prediction models for states' percentages of males in ED, LD, and SL are summarized in Figure 9. The following observations are made.

- Of the three outcome variables, the total (or multiple) R-squared for SL male percentages was the highest (.40), that for LD was next (.37), and that for ED was extremely low (.10). Thus, states' male percentages in SL and LD are rather highly related to the predictor variables used, while their ED male percentages are independent of those predictors.
- While DENSITY AND INCOME were major predictors in the models for prevalence, they contributed nothing to predictions of states' male percentages in ED or LD, and contributed little to the SL male percentage model.
- PCTBLACK is a major predictor for both LDMALE% and SLMALE%. The sign in both cases is +. That is, the higher the percentage of blacks among a state's school age children, the higher the state's male percentages in both LD and SL.
- As was seen in Figure 8, there are negative relationships between the respective prevalence rates and male percentages for ED (modest), LD (large), and SL (large).
- It is not clear why EDPREV and LDPREV (with partial R-square values of .044 and .054, respectively) showed up in the model for SLMALE%. Their correlations with SLMALE% were very low and no logical connections between them and SLMALE come to mind. Clearly, they are not major predictors of SLMALE%.

Figure 9: Signs of Correlations and Values of Partial R-Squared for Variables Present in Three Prediction Models of States' Percentages of Males

PREDICTOR	EMOTIONAL DISTURBANCE	LEARNING DISABILITY	SPEECH/ LANGUAGE
POPTOTAL	neg .055		
DENSITY			pos .048
INCOME			
ALCOHOL			
PCTBLACK		pos .241	pos .120
PCTMINOR			
TOTPREV			
EDPREV	neg .044		neg .044
LDPREV		neg .131	neg .054
SLPREV			neg .137
TOTAL R-Squared	.10	.37	.40

Conclusions and Discussion

Prevalence Rates

Conclusion

The predictors used accounted for only 25 percent of the variation among states' ED prevalence rates, but accounted for 41 percent of the variation among states' total prevalence rates. LD and SL had middle values. Thus, the variation among states' prevalence rates due to other factors ranged from 59 percent to 75 percent.

Discussion

No clear prior notions existed as to the degree to which the available predictors might influence prevalence rates, so it was interesting to find that their effects were not negligible. State characteristics, many of which we have no control over, do influence states' prevalence rates.

These findings do not indicate whether the observed differences in states' prevalence rates reflect true differences in the proportions of states' children with exceptional educational needs or reflect differences in the procedures by which and the extent to which children are sought, identified, referred, and enrolled in states' special education programs. For example, some states' policies and procedures may permit, or even encourage, identifying and enrolling children with less severe handicaps, which raises their prevalence rates.

Furthermore, it appears that the definitions of handicapping conditions are not identical across the states, especially for ED. For example, Knitzer, Steinberg, and Fleisch (1990) found that the 20 or so states which included the modifier "seriously" in the ED label and definition had a lower mean ED prevalence than states not using that term. As a result, some of the children who qualify for special education in one state might not qualify if they lived in another state.

Long after the rest of this section was written, an article by Wright surfaced (1990). Wright used multiple regression to examine the relationships between states' definitions of ED and their 1983-84 ED prevalence rates. Three out of eleven definitional components used as potential predictors (severity, etiology or cause, and deviation from the norm) emerged as significant predictors and accounted for 32 percent of the variation in states' ED prevalence rates. Incidentally, Wright's team echoed the concern of Knitzer and others that children who qualified for special education in one state might not qualify in another state.

It seems likely that a combination of potential predictors, including definitional components, demographic characteristics, and other factors mentioned by Wright and his colleagues (such as whether the state includes delinquent or socially deviant youth and autistic children under the ED rubric) would account for even greater proportions of the variations among states' ED prevalence rates. It would also be useful to see what relationships existed between states' demographic characteristics (specifically, INCOME) and the liberalness of definitions they use for ED.

Thus, one cannot say, with certainty, that the "true" total percentage of Wisconsin children with exceptional education needs is exactly 6.03 percent. Nor can one be absolutely certain that our "true" total prevalence is higher than the "true" percentage of such children in Hawaii (4.6 percent) or lower than the "true" rate of 10.9% in Massachusetts, since it is not known whether the relevant definitions, policies, and

procedures in those states are the same as ours. Our rate of 6.03 percent (as the U.S. Department of Education calculates it) reflects the proportion of children whom we identity and serve. The issue of over- or under-identification has not been resolved.

Conclusion

The major predictor variables for the prevalence rates we studied (and the directions of the relationships between those predictor and outcome variables) were as follows:

TOTPREV:	DENSITY (+) and SLMALE% (-)
EDPREV:	INCOME (+)
LDPREV:	LDMALE% (-) and DENSITY (+)
SLPREV:	SLMALE% (-)

Discussion

Since a state's value of TOTPREV is the sum of its prevalence rates for all areas of handicap, there are significant, positive correlations between TOTPREV and each of the three specific prevalence rates: EDPREV ($r = .27$), LDPREV ($r = .59$), and SLPREV ($r = .64$). So it is not surprising that TOTPREV shared some predictors with the variables that helped to comprise it.

Note that, in the model for EDPREV, the predictor INCOME just "nosed out" DENSITY, so TOTPREV and EDPREV have more in common than is shown by these regression results.

Although the three specific prevalence rates (ED, LD, and SL) combine with each other and seven other prevalence rates to comprise TOTPREV, the three are, surprisingly, unrelated to each other. The three intercorrelations among these three specific prevalence rates (see Figure 10 at the end of this section) are: ED and LD ($r = .04$), ED and SL ($r = -.18$), and LD and SL ($r = .09$). This suggests that whatever factors drive states' values of EDPREV do not drive either their LDPREV or their SLPREV values and whatever factors drive LDPREV are not involved with SLPREV. As confirmation of this, no major predictors are shared by any two of the three specific prevalence rates. DENSITY/INCOME (which may reasonably be combined) is the exception.

This finding allows one to sharpen the comments given under the first conclusion of prevalence rates, regarding different states' policies and procedures for identification of children with exceptional education needs. It appears that DENSITY/INCOME, over which educators have little control, has some influence on all of the prevalence rates that were studied except SLPREV. That influence could be either directly on the "true" prevalence rates or indirectly, via policies and procedures, on the proportions of children identified and served.

The direct connection, theoretically, might be that densely populated states are more stressful for children, which results in higher "true" prevalence rates. It may also be that communities in sparsely-populated states are more ready, willing, and able to provide support to children who have problems, thus reducing the "true" number of children who need services from the schools.

The indirect connection, theoretically, might be that states with higher per capita incomes can afford to employ more special education teachers and to have policies and procedures that identify and serve more of those children whose needs are not so severe. In the same vein, densely populated states may tend to have larger district enrollments which provide an economy of scale that permits more extensive service provision. In rural

areas, ED and LD services may not be available, so no referrals are made. At the classroom level, regular education teachers in rural areas may have enrollments that are small enough for them to accommodate the needs of special students.

It should be noted that, while states' per-capita INCOMEs were highly, and positively, correlated with both EDPREV (r = .42) and LDPREV (r = .38), exactly the opposite relationship was found when the unit of analysis was the individual family. Recall that Zill and Schoenborn (1990) found that the higher the family income category, the lower the reported percentages of children who had, at some time in their lives, experienced long-lasting emotional or behavioral problems. The same was true for learning disabilities.

While it may be disconcerting to learn that one study finds a strong, positive relationship between income and the prevalence of both ED and LD, but another study finds exactly the opposite, the fact that one study dealt with states and the other with families helps us to understand and interpret these findings. One implication is that child-find efforts in ED and LD will find more children among the poor than among the rich. Another implication is that many children of poor families who have problems in ED and LD and who live in poor states may be seriously under-identified and under-served.

Another indirect mechanism that may help to explain the specific relationship between EDPREV and DENSITY/INCOME was suggested in a recent National Institute of Mental Health (NIMH) report (1991). The stigma associated with mental illness may prevent the parents of a child with a mental disorder from seeking treatment, particularly in rural areas where the anonymity of large cities is missing. Rural families may not seek treatment for fear that the illness will be discovered by their neighbors.

As mentioned in the summary of regression results for prevalence rates, there were negative correlations between the states' prevalence rates for any of the three areas of handicap (ED, LD, and SL) and the states' corresponding male percentages. Figure 10 shows those correlations between prevalence and male percentages to be: ED (r = -.22), LD (r = - .46), and SL (r = - .37).

This could mean that states whose schools have incentives to search more diligently for children with exceptional educational needs, or whose definitions and criteria for entry into those areas were more inclusive, tended to find their additional students among the females. On the other hand, since it is not clear which causes which, it could mean that where there are incentives to include more balanced proportions of males and females states have done so, not by decreasing the numbers of males, but by identifying more females, thus increasing their total child counts and prevalence rates.

Conclusion

When the effects of the state demographic and male percentage predictors used are accounted for, Wisconsin's four actual prevalence rates compare with the predicted rates (i.e., with the rates of similar states) as follows:

TOTPREV:	Much lower than predicted
EDPREV:	Higher than predicted
LDPREV:	Slightly lower than predicted
SLPREV:	Slightly lower than predicted

Discussion

When one compares Wisconsin with other states and finds that Wisconsin is, to some degree, different, one can not conclude that other states are right and we are wrong, or that we are right and they are wrong. Rightness means identifying, enrolling, and properly serving children who will benefit from special education and not enrolling children who will not benefit from special education, no matter what the other states may do. However, since Wisconsin tends to be on the low side, if there is error in any direction, Wisconsin is probably under-identifying special education children more than over-identifying them, except in ED.

As shown in Figure 11 (at the end of this section), EDPREV is not well predicted by the variables that were used. On the last page of Figure 12 (at the end of this section), it is reported that Wisconsin's ED prevalence rate is the only one that ranks high among the ten conditions listed. ED is the "odd fish" that does not swim in the same direction as the other "fish," and it is not clear why. Knitzer (1990) noted that a state's use or non-use of the modifier "severely" in its definition of ED would probably be a potent predictor variable. Wright and others (1990) provided evidence that states' definitions of ED do influence their ED prevalence rates.

Percentages of Males

Conclusions

- The total proportions of variation among states' male percentages accounted for by these predictors ranged from 10 percent (for ED male percentages) to 40 percent (for SL male percentages). Thus the variation in male percentages due to other factors ranged from 60 percent to 90 percent.

ED was the disability area that was most difficult to predict in this study and, consequently, the most difficult to understand with regard to both prevalence rates and male percentages.

- While demographic variables were major contributors in the prediction of prevalence rates, they play little or no role in the predictions of male percentages, except for the predictor, PCTBLACK.
- The major contributors to the regression models for the three male percentages (and the signs of the underlying correlation coefficients) were as follows:

EDMALE%:	No majors; POPTOTAL (-) and EDPREV (-) were minor contributors.
LDMALE%:	PCTBLACK (+) and LDPREV (-)
SLMALE%:	SLPREV (-) and PCTBLACK (+)

Discussion

Just as the male percentages for ED, LD, and SL predicted their respective prevalence rates, the prevalence rates for 1989 "predicted" their respective male percentages five years earlier.

It is worth noting that the larger the percentage of black children in a state, the higher the percentage of males in both LD and SL. It would be useful to find out if black males are much more likely to be enrolled in LD programs than are black females or either white

males or females. Unfortunately, it is impossible to tell from these present analyses whether black males, in fact, are more apt to have difficulties related to LD and SL or there is something about the process that raises their chances of entering LD or SL programs.

Finally, if the state demographic variable, PCTBLACK is so highly related to LDMALE% (r = .49 in Figure 10) and to SLMALE% (r = .29), why is it not related to EDMALE% (r = .05)? The reason may be related to geographic regions of the United States or it may have something to do with the unfathomable nature of the states' ED values.

EDMALE% is a variable of particular interest because ED is the area where the disparity between males and females is greatest, not only in Wisconsin, but nationally. Is the "odd fish," EDMALE%, significantly correlated with anything?

In the far upper left-hand corner of the correlation matrix in Figure 10, it is seen that states' values of EDMALE% are rather highly correlated with LDMALE% (r = .38). EDMALE% is not significantly correlated with any other variable that was examined. It is not correlated with SLMALE% (r = .15), while LDMALE% and SLMALE% are highly correlated (r = .45). Could it be that there is a "general male percentage" factor? If so, what part does EDMALE% play in it?

To answer these questions a principal components factor analysis was done, using values of all thirteen variables for the 50 states. Briefly stated, factor analysis examines all intercorrelations (as presented in Figure 10), sorts the variables into groups (factors) of inter-related variables, and reports the degree of association ("loading") of each variable to each factor. It was found that LDMALE% and SLMALE% were included in a large, general factor which also included PCTBLACK. The mystery variable, EDMALE%, showed up as an isolated factor, unrelated to any other factor. The mystery continues.

Conclusion

When the effects of the predictors used are accounted for, Wisconsin's actual male percentages compared with the predicted values as follows:

EDMALE%: Wisconsin's actual ED male percentage was slightly higher than predicted, but comparisons are not meaningful since the prediction model was so weak (R-squared = .10).

LDMALE%: Wisconsin's actual LD male percentage was somewhat higher than predicted.

SLMALE%: Wisconsin's actual SL male percentage was about as predicted.

Figure 10: Intercorrelations Between All Pairs of Variables: Percent Males in ED, LD, & SL; Prevalence Rates; State Demographics

	EDMALE%	LDMALE%	SLMALE%	TOTPREV	EDPREV	LDPREV	SLPREV	POPTOTAL	DENSITY	INCOME	PCTBLACK	PCTMINOR	ALCOHOL
EDMALE%	1.000	0.377	0.145	-0.035	-0.218	-0.064	0.143	-0.234	0.040	-0.089	0.050	-0.068	-0.063
	0.000	0.007	0.315	0.808	0.129	0.659	0.323	0.101	0.785	0.537	0.728	0.640	0.666
LDMALE%		1.000	0.449	-0.229	-0.153	-0.463	0.040	0.180	-0.141	-0.284	0.491	0.237	-0.219
		0.000	0.001	0.110	0.289	0.001	0.781	0.212	0.328	0.046	0.000	0.097	0.127
SLMALE%			1.000	-0.301	-0.073	.190	-0.370	0.146	0.206	0.187	0.289	0.137	0.104
			0.000	0.033	0.613	0.186	0.008	0.311	0.151	0.193	0.042	0.345	0.474
TOTPREV				1.000	0.271	0.593	0.636	-0.132	0.411	0.214	-0.009	-0.268	-0.100
				0.000	0.057	0.000	0.000	0.359	0.003	0.135	0.948	0.060	0.490
EDPREV					1.000	0.036	-0.177	0.036	0.326	0.422	-0.103	-0.158	0.082
					0.000	0.803	0.219	0.806	0.021	0.002	0.479	0.273	0.571
LDPREV						1.000	0.094	-0.112	0.418	0.379	-0.224	-0.155	0.293
						0.000	0.517	0.437	0.003	0.007	0.117	0.282	0.039
SLPREV							1.000	-0.095	0.133	-0.128	0.145	-0.063	-0.230
							0.000	0.510	0.356	0.377	0.317	0.664	0.107
POPTOTAL								1.000	0.218	0.306	0.194	0.394	-0.036
								0.000	0.129	0.031	0.178	0.013	0.803
DENSITY									1.000	0.669	0.135	0.070	0.116
									0.000	0.000	0.351	0.629	0.422
INCOME										1.000	-0.091	0.082	0.558
										0.000	0.528	0.573	0.000
PCTBLACK											1.000	0.553	-0.197
											0.000	0.000	0.170
PCTMINOR												1.000	0.083
												0.000	0.566
ALCOHOL													1.000
													0.000

IN EACH CELL, THE FIRST VALUE IS THE PEARSON CORRELATION COEFFICIENT. THE SECOND VALUE IS THE PROBABILITY THAT, WITH REPEATED MEASUREMENTS, THE TRUE CORRELATION WOULD BE FOUND TO BE ZERO. THE DIAGONALS ARE THE CORRELATIONS BETWEEN A VARIABLE AND ITSELF. IN ALL CELLS N = 50 STATES.

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Figure 11: Descriptive Statistics For Predictor And Outcome Variables For All 50 States, Plus Wisconsin's Values and Ranks

Variable	Year	Mean	S.D.	Min	Max	Wisconsin	Rank
POPTOT*	1980	4,513	4,717	402	23,668	4,706	16
DENSITY	1980	154	221	1	986	87	25
INCOME	1989	16,550	2,962	11,800	24,600	16,800	20
ALCOHOL	1986	2.6	0.6	1.6	5.1	3.2	5
PCTBLACK	1984	13.2	13.3	0.3	50.4	7.7	27
PCTMINOR	1984	23.6	17.5	1.1	76.9	11.3	36
TOTPREV	1989	7.6	1.2	4.6	10.9	6.03	47
EDPREV	1989	0.7	0.4	0.3	1.7	1.05	10
LDPREV	1989	3.6	0.7	1.6	5.7	2.69	46
SLPREV	1989	1.8	0.5	0.6	3.0	1.15	45
EDMALE♂	1984	78.3	4.0	66.9	85.6	79.6	19
LDMALE♂	1984	70.6	2.5	64.5	75.5	73.1	10
SLMALE♂	1984	63.1	1.4	60.0	66.0	64.1	13

* Expressed In Thousands

Figure 12: Percentage of All Children Ages 6-21 in the Population Served Under Chapter 1 of ESEA (SOP) and EHA-B During School Year 1988-89

State	All Areas	Learning Disabil.	Speech/ Language	Mentally Retarded	Emotional Disturb.	H. of Hear and Deaf	Multi-Handicap	Orthoped. Impair	Other Health	Visual Impair	Deaf/ Blind
Massachusetts	10.92	3.85	2.51	2.31	1.50	0.15	0.24	0.12	0.15	0.07	0.01
Alaska	9.76	5.25	2.08	1.49	0.42	0.11	0.22	0.06	0.09	0.03	0.00
New Jersey	9.57	4.83	2.97	0.37	0.85	0.08	0.37	0.03	0.03	0.02	0.00
Alabama	9.37	3.18	2.22	2.97	0.62	0.10	0.10	0.05	0.07	0.04	0.00
West Virginia	9.13	4.17	2.34	1.88	0.50	0.08	0.00	0.07	0.03	0.05	0.00
Maine	9.03	3.95	1.97	1.00	1.45	0.10	0.33	0.08	0.10	0.03	0.00
Vermont	8.98	3.89	2.59	1.30	0.68	0.15	0.12	0.10	0.11	0.04	0.01
Rhode Island	8.54	5.68	1.37	0.48	0.68	0.08	0.04	0.07	0.11	0.03	0.00
Connecticut	8.46	4.52	1.32	0.56	1.70	0.09	0.13	0.04	0.05	0.06	0.00
Illinois	8.34	3.86	2.09	1.01	1.04	0.11	0.01	0.11	0.07	0.04	0.00
Tennessee	8.25	4.28	1.98	1.17	0.22	0.13	0.16	0.08	0.16	0.08	0.00
Missouri	8.24	3.87	2.14	1.29	0.69	0.08	0.04	0.06	0.04	0.02	0.00
Delaware	8.17	4.62	1.06	0.83	1.17	0.11	0.10	0.15	0.09	0.04	0.02
Maryland	8.13	4.15	2.39	0.55	0.40	0.12	0.29	0.06	0.09	0.07	0.01
Florida	7.97	3.38	2.39	1.02	0.09	0.07	0.00	0.08	0.10	0.03	0.00
South Carolina	7.96	3.15	2.06	1.75	0.70	0.11	0.04	0.08	0.02	0.05	0.00
Iowa	7.93	3.50	1.43	1.61	1.01	0.11	0.09	0.14	0.00	0.03	0.00
New Mexico	7.90	3.79	2.29	0.55	0.83	0.10	0.16	0.13	0.02	0.03	0.01
Wyoming	7.74	4.18	2.04	0.57	0.47	0.13	0.00	0.12	0.18	0.04	0.00
Mississippi	7.69	3.74	2.47	1.21	0.03	0.07	0.04	0.09	0.00	0.03	0.00
Nebraska	7.69	3.33	2.01	1.15	0.65	0.13	0.10	0.17	0.10	0.05	0.00
Utah	7.64	3.37	1.42	0.62	1.74	0.11	0.22	0.05	0.06	0.04	0.01
Oklahoma	7.62	3.63	2.00	1.47	0.19	0.08	0.17	0.04	0.02	0.03	0.00

State	All Areas	Learning Disabil.	Speech/ Language	Mentally Retarded	Emotional Disturb.	H. of Hear and Deaf	Multi-Handicap	Orthoped. Impair	Other Health	Visual Impair	Deaf/ Blind
Indiana	7.56	2.88	2.63	1.48	0.33	0.09	0.06	0.04	0.01	0.04	0.00
Ohio	7.47	2.91	1.94	1.70	0.30	0.08	0.36	0.14	0.00	0.04	0.00
Oregon	7.47	4.03	1.88	0.59	0.45	0.17	0.00	0.14	0.16	0.05	0.00
Minnesota	7.42	3.52	1.40	1.06	1.09	0.13	0.02	0.12	0.04	0.04	0.00
Arkansas	7.38	3.96	1.16	1.91	0.05	0.10	0.10	0.02	0.04	0.04	0.01
Kentucky	7.38	2.39	2.34	2.00	0.31	0.09	0.12	0.05	0.03	0.05	0.00
South Dakota	7.37	3.32	2.19	0.93	0.31	0.17	0.24	0.10	0.05	0.03	0.02
Pennsylvania	7.31	3.11	1.97	1.34	0.69	0.11	0.00	0.05	0.00	0.05	0.00
Montana	7.30	4.07	1.82	0.59	0.33	0.11	0.16	0.05	0.09	0.08	0.00
Virginia	7.16	3.66	1.67	0.98	0.57	0.09	0.07	0.05	0.04	0.04	0.00
North Dakota	7.04	3.37	2.19	0.96	0.27	0.10	0.00	0.07	0.04	0.04	0.01
Texas	7.03	3.97	1.39	0.58	0.57	0.10	0.09	0.09	0.21	0.04	0.00
North Carolina	6.98	3.02	1.55	1.38	0.60	0.12	0.09	0.06	0.14	0.04	0.00
Kansas	6.92	2.90	1.90	0.99	0.77	0.11	0.10	0.07	0.04	0.04	0.01
New York	6.90	4.09	0.61	0.58	1.12	0.09	0.23	0.05	0.08	0.03	0.00
Idaho	6.89	3.93	1.18	1.07	0.18	0.11	0.09	0.12	0.20	0.02	0.00
New Hampshire	6.64	4.07	1.10	0.40	0.66	0.09	0.10	0.06	0.13	0.04	0.00
Michigan	6.61	2.94	1.48	0.90	0.89	0.11	0.08	0.16	0.03	0.03	0.00
Colorado	6.51	3.18	1.04	0.43	1.19	0.10	0.42	0.10	0.00	0.03	0.01
Nevada	6.49	3.92	1.34	0.48	0.39	0.06	0.12	0.09	0.05	0.03	0.00
Washington	6.39	3.32	1.17	0.71	0.41	0.14	0.19	0.09	0.33	0.03	0.00
Arizona	6.38	3.60	1.42	0.53	0.42	0.12	0.16	0.06	0.05	0.03	0.00
California	6.32	3.78	1.45	0.38	0.18	0.11	0.08	0.10	0.18	0.04	0.00
Wisconsin*	**6.03**	**2.69**	**1.15**	**0.93**	**1.05**	**0.08**	**0.00**	**0.07**	**0.04**	**0.03**	**0.00**
District of Columbia	5.71	2.75	0.88	0.92	0.81	0.03	0.15	0.07	0.05	0.04	0.01

State	All Areas	Learning Disabil.	Speech/ Language	Mentally Retarded	Emotional Disturb.	H. of Hear and Deaf	Multi-Handicap	Orthoped. Impair	Other Health	Visual Impair	Deaf/ Blind
Louisiana	5.56	2.24	1.62	0.94	0.34	0.11	0.07	0.08	0.12	0.04	0.00
Georgia	5.46	1.60	1.16	1.43	1.10	0.07	0.00	0.05	0.02	0.03	0.00
Hawaii	4.60	2.61	0.83	0.48	0.31	0.10	0.08	0.11	0.05	0.03	0.00

*Wisconsin's Ranking

All Conditions	47th of 51 Reporting Jurisdictions
Learning Disabled	47th of 51 Reporting Jurisdictions
Speech and Language	45th of 51 Reporting Jurisdictions
Mental Retardation	29th of 51 Reporting Jurisdictions (tied with 1 other state)
Emotional Disturbance	10th of 51 Reporting Jurisdictions
Hard of Hearing and Deaf	43rd of 51 Reporting Jurisdictions (tied with 6 other states)
Multi-Handicapped	46th of 51 Reporting Jurisdictions (tied with 7 other states)
Orthopedically Impaired	30th of 51 Reporting Jurisdictions (tied with 5 other states)
Other Health Impaired	34th of 51 Reporting Jurisdictions (tied with 6 other states)
Visually Handicapped	39th of 51 Reporting Jurisdictions (tied with 17 other states)
Deaf/Blind	30th of 51 Reporting Jurisdictions (tied with 38 other states)

1. **Data Source:** U.S. Department of Education's 12th Annual Report to Congress on the Implementation of the Education of the Handicapped Act, 1990, Table AA23.

2. Percentages of children served are based on Census Bureau estimates of resident populations for July, 1988.

3. Wisconsin's multi-handicapped children (1.45% of the population) are categorized here according to their primary handicapping condition.

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Wisconsin Gender Disparities by Age Level

Introduction

There are many more males than females, ages 0 to 21, in Wisconsin's special education programs in the areas of Emotional Disturbance (81 percent males), Learning Disabilities (71 percent males), and Speech and Language (66 percent males). In Section One a number of hypotheses were posed to account for these disparities, only a few of which could be investigated using readily available data.

One hypothesis that could be studied with available data is as follows: Males and females with primary handicapping conditions of Emotional Disturbance (ED), Learning Disabilities (LD), and Speech or Language Impairments (SL) are referred and enter those areas in fairly equal numbers, but (for various reasons) males stay in those programs longer than females do.

If this hypothesis is true, one would expect the ED, LD, and SL proportions of males to be closer to 50 percent at younger ages and to increase with increases in age. Furthermore, the counts of females in these three program areas would reach a peak and then decline at earlier ages than the counts of males.

Two sets of analyses were done. The first was a single-year (cross-sectional) analysis and the second involved data for five years (longitudinal).

Cross-Sectional Analyses

Data were obtained from the December 1, 1990 unduplicated child count for each of the three areas, ED, LD and SL. While the data included the statewide counts and percentages of males and females at each age level, only the male percentages are presented here. Further, only those age groups totaling 30 or more children are presented here. Percentages based on fewer than 30 cases statewide are too volatile to be useful. This resulted in the omission of only one or two of the youngest or oldest age groups.

ED Results

- The December, 1990 male percentages of Wisconsin children, whose primary handicapping condition was ED, are given below.
- The counts of ED females (not shown here) increased with age, reached a peak at age 16, and decreased thereafter. The counts of ED males (not shown) peaked at 15 and started to decrease at age 16, a year earlier than for the females.

Figure 13

Age	3	4	5	6	7	8	9	10	11
Male %	.69	.80	.80	.77	.82	.81	.82	.83	.82

Age	12	13	14	15	16	17	18	19	20
Male %	.86	.83	.82	.80	.75	.74	.78	.77	.76

ED Discussion

- The hypothesis was not supported by either set of results, especially from about age 13 and up.
- The steady increases in the counts of both males and females in ED to ages 15 and 16, respectively, indicate that more students were being added in ED than were (for whatever reasons) leaving ED.
- ED students are more apt to drop out of school between ages 16 and 21 than students in other special education program areas. Some of the reductions in counts, which start at age 15 for males and at age 16 for females, may be due to dropping out.

An inspection of Wisconsin's percentages of special education students, ages 16-21, who left the educational system for any reason in 1989-90 revealed that 30.0 percent of all ED "leavers" dropped out (versus 15.8 percent of all special education leavers). Furthermore, the status of 21.4 percent of all ED leavers was unknown (versus 9.8 percent across all special education areas).

It is plausible that ED males are more apt to drop out than are ED females. This would explain the drop in male percentages from age 12 to age 16. However, the "leaver" data revealed that female ED students dropped out at the same rate as males, although they had a slightly smaller percentage with unknown status (17.6 percent) than did the ED males (22.8 percent).

LD Results

- Male percentages, by age, for LD in 1990 are given here.
- The counts of LD females peaked with the 11-year olds and decreased from age 12 and up. The counts for LD males increased to age 11, decreased for the 12-year olds, rose again for age 13, decreased again for age 14, rose yet again for age 15, and finally, for the 16-year olds, started to decrease and continued to do so.

Figure 14

Age	3	4	5	6	7	8	9	10	11
Male %	.61	.71	.70	.68	.70	.69	.70	.70	.70

Age	12	13	14	15	16	17	18	19	20
Male %	.69	.72	.71	.70	.71	.71	.71	.77	.82

LD Discussion

- From age 4 to age 18, the percentages of males in LD were consistently in the range of 68 percent to 72 percent. This does not support the hypothesis. Only at ages 3 and 4 (as was seen for ED) and at ages 18 to 20 was there support for the hypothesis.
- The decrease in the female count at an earlier age than that for males does, in fact, support the hypothesis.
- If the hypothesis is true at all, it fits the LD data better than it fits the ED data and, as shown below, better than it fits the SL data.

SL Results

- Male percentages, by age, for SL in 1990 are given here.
- The total counts of both males and females peaked with the five-year olds, decreased at age six, and continued to decrease thereafter.

Figure 15

Age	1	2	3	4	5	6	7	8	9
Male %	.63	.64	.68	.67	.68	.68	.68	.65	.64

Age	10	11	12	13	14	15	16	17	18
Male %	.62	.65	.58	.60	.58	.58	.55	.57	.63

SL Discussion

- As with both ED and LD, the percentages of males in SL increased with age for the very youngest age groups. However the male percentages did not continue to increase, which does not support the hypothesis. In fact, starting with the eight-year olds, the percentages of males gradually decreased as age increased. This is roughly the same pattern as was seen for ED.
- The fact that the total counts of males and females peaked at the same age (5 years) and declined steadily thereafter does not support the hypothesis.

Longitudinal Analyses

The data for different age groups presented above were for one school year, 1990-91. Those data do not show what has happened for any intact age group over time, but show the status of each age group at one point in time. The assumption is that as any cohort of children (that is, children born in the same year) advances in age, its numbers and male percentages would be approximated or represented by the cross-sectional data already examined. To use the 1990-91 data alone requires the assumption that the 1990-91 school year is reasonably representative of all recent school years.

A longitudinal analysis was done on each of the three special education program areas to verify these assumptions and to see if any clearer patterns emerged. The percentages of males for 20 cohorts in ED, 21 in LD, and 20 in SL were examined for five successive years, 1986-87 through 1990-91. Data prior to 1986-87 are archived and are not easily accessible.

As in the cross-sectional analyses, the total count of males and females in a cohort for any school year had to be 30 or more to be included in these analyses. Consequently, there may only be one or two years' data for the very youngest or the very oldest cohorts. For example, members of the youngest ED cohort (cohort "U") were only three years old in December 1990, so only one year of usable data was available for them.

A single "observation" had a value for age and a value for the percentage of males. There were five such "observations" for most cohorts, representing five consecutive years. Results were plotted separately for ED, LD, and SL. In each plot, the horizontal axis (the

independent or predictor variable) represented children's age and the vertical axis (the dependent or outcome variable) represented the percentage of males. An observation's values for age and male percentage were its coordinates in the resulting scatter plot.

Cohorts were given code letters (A-V) so that the observations for individual cohorts over the years could be identified. The code letters correspond to year of birth, so the letters A, B, and C (the three oldest cohorts) are seen in the right-hand portion of each scatter plot and the letters T, U, and V are seen in the left-hand portion.

Before commenting on patterns observed in each scatter, three general points may be made which apply to all three disability areas.

First, in Figure 16 the lowest median ED male percentage is about 75 percent. Thus, there is a baseline disparity of 50 percent between male and female percentages. It is not reasonable to attempt to account for that baseline disparity between Wisconsin males (75 percent) and females (25 percent) by means of information provided by the scatter plot, and no attempt will be made to do so. Attempts are made to explain only the ED male percentage variations between 75 percent and 85 percent at different ages, as shown in Figure 16. Similar, but smaller, baseline disparities exist for LD and SL as shown in Figures 17 and 18.

Second, just as the percentage of males varies from age to age, so does the total number of children, although total counts are not shown. As will be seen, the smaller numbers of children at the extreme age levels result in increased variation in male percentages among different cohorts at those ages. Because of this increased variation, the representativeness of any single year's male percentage value, as was given in the cross-sectional analysis, above, is satisfactory at intermediate ages, but not at the extreme age ranges. Judgements about whether there are sizable male percentage changes from one age level to the next become increasingly speculative at the extreme age ranges, as do any comments about what may cause changes in male percentages.

Finally, these are state-wide data and they provide rather general patterns of what is happening in Wisconsin's schools. The patterns that appear in these three figures and the suggested possible causes for those patterns may or may not correspond to what is happening in individual districts.

ED Results

- The general shape of the scatter for ED (Figure 16) is arched. Younger children (ages 3 to 4) have male percentages around 74 percent to 76 percent. Male percentages rise and reach a peak (about 84 percent) at age 12. From age 12 to age 17 there is a sharp decrease in ED male percentages, which is common to all but cohort "E". After age 17 the patterns become indistinct.
- There is much greater variation in male percentages for the younger ages and for the older ages than for age levels in the middle. This effect, which is also seen in the plots for LD and SL, is due, at least in part, to the smaller numbers of children at the extreme ages. It may also be that other factors than age are involved at the extreme age ranges.

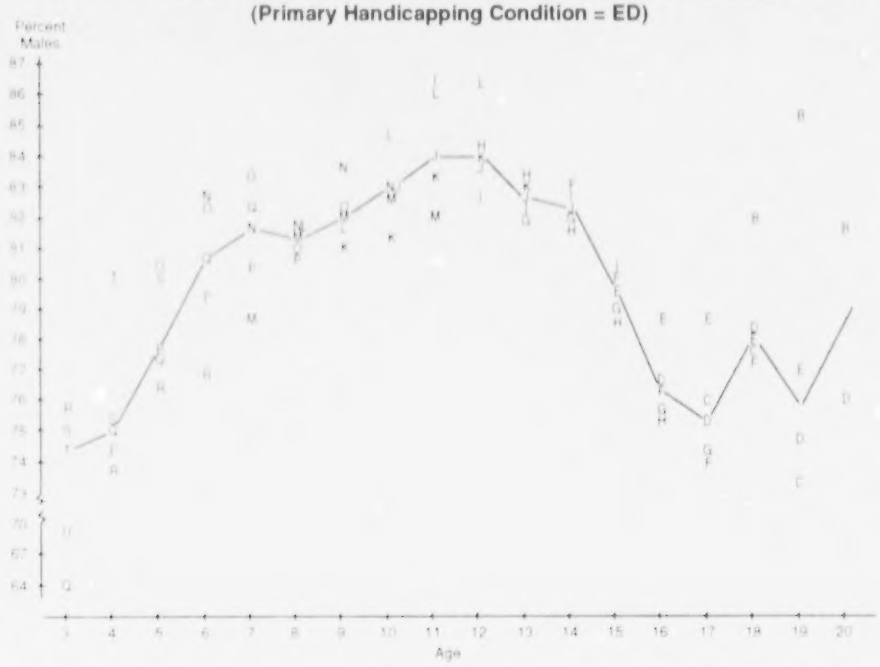
ED Discussion

The hypothesis, that females leave ED programs earlier than males do, gave rise to the prediction of a relatively straight-line increase in male percentages as age increased. This would be expected if one or more causal factors were at work across all age levels. Figure 16 does not show this.

For simplicity and clarity, lines have been drawn on the scatter to connect successive median male percentage values. This line has enough obvious changes in its slope to suggest that different factors affect the percentage of ED males at different ages.

• There is a rapid rise in male percentages from age 3 to age 6. An inspection of the total counts of males and females from ages three to seven indicated that males are being added to ED programs at a faster rate than females, especially at ages 4 and 5, which are pre-kindergarten and kindergarten ages.

Figure 16: Percentage of Emotionally Disturbed Children Who Are Male, By Age (Primary Handicapping Condition = ED)



— It does seem likely that the sorts of emotional problems of both males and females who are identified and referred for ED at such early ages are different from those of children who enter ED programs at later ages. Quite possibly the causes of their problems are different as well. For them to have been identified so early suggests that the severity of their problems may be greater than those of children identified and referred at later ages.

— A quick check of data for December, 1990 revealed that about 50 percent of all ED children (males plus females), ages six and younger, have secondary handicapping conditions versus about 22 percent of all ED children across all ages. This would support the idea that the problems of the younger ED children are apt to be more severe, or at least more complex.

— Incidentally, no differences were seen between the December, 1990 percentages of ED males and females at these ages who had secondary handicapping conditions. A preliminary hypothesis (not listed in Section One) to explain the gender disparity was that males are more likely to have multiple handicaps and, thus, are more likely to be identified than females. The fact that no differences were found does not support that hypothesis, at least not for ED.

• From age 6 to age 12 the disparity between male and female percentages in ED continues to increase, but at a more moderate rate. It is during these years that additional children, both males and females, are being added to ED programs. With the increasing numbers of children, the male percentages, of necessity, become more and more stable. That is, it would take an extremely large change in the raw number of ED males or females to show up as a noticeable change (say 3 percent or more) in the male percentage.

— Nevertheless, during these years of elementary school, more males than females are being added to ED programs. The increased percentages of males, up to about age 12, are not due to females leaving ED programs earlier than males do, but to the continued entrance of more new males than new females into ED programs. Thus the hypothesis, that females leave ED earlier than males, is not supported.

- From age 12 to age 14, the curve turns downward somewhat. This means that females are being added to ED, at least proportionately, at a higher rate than males. Apparently, some females who either did not have, or were not identified as having, emotional problems at younger ages are starting to be identified in their early teens.

— A reversal in the slope of such a curve suggests either the introduction of new and different causal factors or the dying out of factors that had an early influence, or both. These are the years of puberty and adolescence as well as the change from elementary school to secondary school. The possible causes that might be investigated to explain the downward turn of the curve are rich and varied, as shown by the questions that are raised in the following paragraphs.

— What part does maturation play? Do social problems which often arise at these ages affect males and females differently? What part do genetics and physiology play?

— Does the move to secondary school affect males and females differently? For example, does the adult female-dominated elementary school environment contribute to the problems of male children? Conversely, does the adult male-dominated secondary school environment contribute to the problems of female children?

— Is the identification process involved? Were the newly identified females not referred at earlier ages because their emotional problems only appeared during their teens? Did they actually have problems which were not noticed by adults when they were younger? Were the emotional problems of these females noticed at earlier ages but judged not to be serious enough to merit referral for ED or, if they were referred, not serious enough to constitute an exceptional educational need?

— It is obvious that one would have to get much closer to the schools and to the children in order to answer questions such as these.

- From age 14 to age 17 there is a steep and fairly uniform decrease in the percentage of ED males, although one cohort ("E") departs slightly from the others. The decrease of about 6 percent is significant, especially when it is noted that the total counts (males plus females) for individual cohorts at these ages are still well above 1,000 children. Stated in other terms, the male-female disparity has decreased from 64 percent (i.e., 82 percent minus 18 percent) to 52 percent (i.e., 76 percent minus 24 percent).

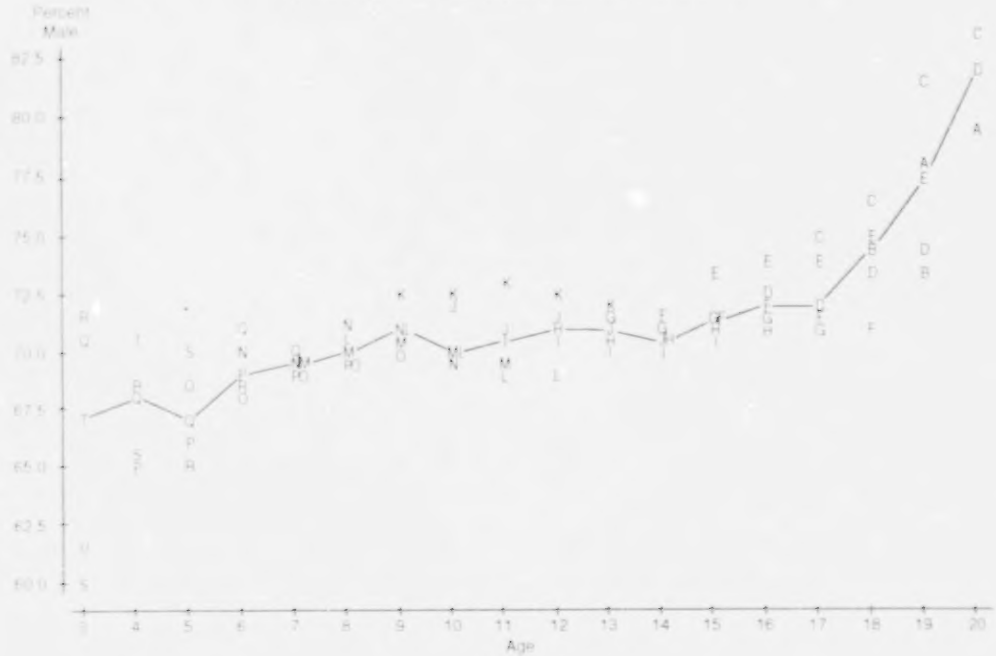
— It may be that this steep decline is merely a continuation and an intensification of the decline from age 12 to age 14, and that its root causes are the same. The results of the examination of "leaver" data for 1989-90, mentioned in the cross-sectional analysis, indicate that the decline is not due to greater drop-out or status unknown rates for ED males than for ED females, which would be a new and different causal factor. These data provide no evidence that this steep decline is due to anything other than a continuation of whatever factors started to have an effect at ages 12-14, as discussed above.

- There is a temporary 2 percent or 3 percent rise in the male percentage from age 17 to age 18. This "bump" may be due to the fact that ED males are often graduated a year late, while ED females are more apt to be graduated "on time" (at age 17). One cohort ("B") appears to show the same one-year upward "bump," but it lags behind the others by a year.

LD Results

- The curve for LD is generally S-shaped. The median percentage of males never really declines with increases in age, but there is a long stretch where the male percentages stay at about 70 percent to 71 percent. There are small increases in male percentages with increases in age at the younger ages (from age four to age seven) and larger increases at the older ages (17 to 19).
- The level portion of the LD curve extends through more age groups than was true for ED.
- There is less variation in cohorts' male percentages at the extreme age ranges than was seen with ED.

Figure 17: Percentage of Learning Disabled Children Who Are Male, By Age (Primary Handicapping Condition = LD)



LD Discussion

- As mentioned in the cross-sectional discussion, if the hypothesis (that females leave special education programs earlier than males) is true to any degree, it is more true for LD than for ED or for SL. However, throughout the ages that correspond to regular school years, the increases in male percentages are barely noticeable (from about 69 percent to about 72 percent), especially when compared to the overall disparity of 42 percent between males (71 percent) and females (29 percent).
- As with ED, there is a noticeable disparity between the percentages of LD males and females at even the youngest ages for which we have data. Incidentally, it is curious that any child of age three, four, or five could be diagnosed as having learning disabilities, since LD is typically defined as achieving at a significantly lower level than would be predicted from measures of intelligence. Perhaps some of these children have developmental delays, the exact nature of which cannot be determined, and LD was judged to be the most appropriate classification.

- Why is the LD curve so level during the typical school years, especially when compared to the curve for ED? It is clear that, from age 7 to age 15, males and females are entering and leaving LD programs in proportional numbers. This suggests that no new factors come into play during those years.

— Perhaps the flatness of the curve is related to the fact that the definition of LD is quite specific, especially when compared with the definition of ED. Further, Wisconsin's definition of LD is tied closely to school achievement, while the definition of ED includes references to behavior problems in school, at home, and in the community. One final possible explanation is that the total numbers of children, ages 7 to 15, whose primary disability is LD, are roughly double the numbers of ED children at those ages. This may have a tendency to make the male and female LD percentages more stable than those for ED. These factors may all contribute to the flatness of the LD curve during the years of schooling.

- From age 15 and, clearly, from age 17 on, there is a noticeable rise in male percentages. As noted in the cross-sectional analyses, the total counts of LD females start to decline at age 12, while the total counts for males do not really start to decline for good until later. Again, this supports the original hypothesis.

— The sharp swing upward at about age 17 may very well be related to the age of graduation, as was suggested to explain the 18 year old "bump" seen in the ED curve. One plausible explanation is that LD males are graduating a year or more late while LD females are graduating "on-time." The fact that LD has no 18 year old "bump" could be due to the fact that LD "leavers" are much more likely to graduate with a diploma (typically 80 percent) than ED "leavers" are (typically 45 percent).

SL Results

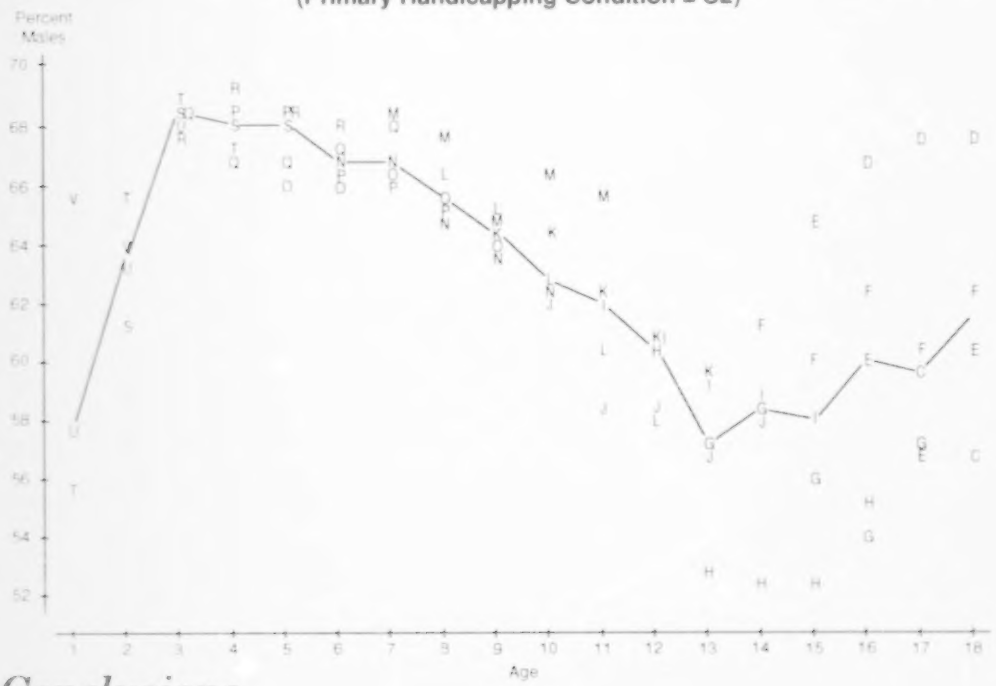
- Like the ED curve, the curve for SL is arched. Male percentages at the very youngest ages are in the range of 57 percent to 64 percent. They quickly rise to about 68 percent at ages three and four and then decline gradually to about 57 percent at age 13.
- The total counts of both males and females peak at age 6 (not shown in Figure 18).
- The variability of male percentages among cohorts is extremely large at ages 13 and older.

SL Discussion

- It is obvious that the hypothesis is not supported by these results.
- One notable difference between the SL curve and the curves for ED and LD is that the highest male percentages for SL are reached at much younger ages. This may be because the identification and referral of children for SL disabilities occur at much earlier ages than for ED and LD. Even by age 3 the SL cohorts consistently have total counts of more than 1,000 children.
- While it is impossible to tell from these data, it is likely that many children who were identified at age 2 or 3 have speech and language impairments that are different in type and severity from those who were identified at, say, age 5 or 6.
- The steady decline in male percentages from age 5 to about age 13 is due to slightly greater proportions of males than females leaving SL. Again, the hypothesis is not supported.
- The cause of this steady decline is not apparent. It is possible that males withdraw voluntarily from SL as they grow older, while females do not. Incidentally, there are certain dynamics that make it difficult or un-rewarding for ED males to withdraw for ED, although some males might wish to do so.

- As mentioned earlier, the great variation regarding male percentages among cohorts at the higher ages is due to the much smaller numbers of cases at these ages. While the pattern is indistinct at the upper age ranges, it appears that there is another rise in SL male percentages from age 13 to age 18.
- It should be noted that SL is very often the secondary handicapping condition for children who have some other primary handicapping condition (such as ED, LD, or Cognitive Disabilities). These data are only for children whose primary handicapping condition is SL. It is possible that the shape of the SL curve would be somewhat different if all children served in SL programs were included.

Figure 18: Percentage of Speech and Language Children Who Are Male, By Age (Primary Handicapping Condition = SL)



Conclusions

- If the hypothesis being investigated (i.e., that females leave these special education areas at earlier ages than males do) is at all true, it is more true for LD than for ED or SL.
- There are variations in the male percentages of all three areas of disability with differences in age. Those variations are not apparent when a single statewide male percentage value is reported.
- The differences in the shapes of the curves for the three special education areas, suggest that the causes of these disparities between the percentages of males and females may be categorically different for ED, LD, and SL, may be different in degree, or may have their influence at different ages.
- For all three areas, the lowest median male percentages, at any age levels, are well above 50 percent. The lowest male percentage medians for ED were about 57 percent, that for LD was about 67 percent, and those for SL were about 57 percent. These baseline disparities are not accounted for by the data we have used.
- Male percentage data from any single year, as were given in the cross-sectional analysis, are more representative for the middle ranges of age than for the younger or older age ranges.

Summary, Discussion, and Recommendations

In this section the aptness of each hypothesis presented in Section One is examined and recommendations for future study are offered.

The observed gender disparities are due to real differences between males and females.

The disparities are due to biological differences.

Four general biological factors were identified in the literature which may account for advantages for females and, thus, some portion of the gender disparities observed in ED and LD. They are:

- Genetic advantages of females,
- Fetal and birth-related stress experienced more often by males,
- The effects of male hormones, and
- The effects of chemicals involved in neural transmission.

The first two of these have not been linked to gender differences in either ED or LD, although future research could find connections not yet seen. Male hormones are associated with anger and aggressive behavior, but the connection is far from simple and much is yet to be learned. One reference was found (Rossi, 1972) in which a particular neuro chemical was said to exist at insufficient levels among boys more often than among girls and that insufficiency was associated with dyslexia. While further research in this vein probably has been published, the literature search did not uncover it.

It should be noted that authors who described the degree to which relevant characteristics are heritable also reported that environmental factors, such as early learning and pupil services, play at least as great a part as do genetic factors.

Two additional issues indicate that the observed gender disparities in ED and LD are due to more than just biological factors. First, given that females have a number of physical or biological advantages, it is not clear why the male percentages in ED (80 percent), LD (70 percent), and SL (65 percent) are so high, while the male percentages in the more purely medical or physical disability areas only range from 52 percent to 57 percent. One would expect that, if biological disadvantages of males contribute to their disabilities, all disability areas would be affected rather equally.

Second, while genetic factors might account, in part, for the modest research-identified male to female ratios, the larger male to female ratios seen in school enrollments for ED and LD must be due to other factors.

The disparities are due to differential maturation rates.

This area is not well represented by the works that were reviewed. As a result, it is difficult to judge the aptness of this hypothesis. It is generally agreed that boys mature physically more slowly than girls, especially at the elementary school level. However, no information was found in the literature that explained why this happens or whether similar maturation rate differences also occurred in the cognitive, social, and emotional domains. None of the works that were reviewed stated that the gender differences in ED or LD were due to maturation differentials, although that possibility does exist.

The disparities are due to learned differences.

Child-rearing practices are usually quite different for boys and girls. As a result, boys learn that aggressive, independent, active, dominant, and impulsive, behaviors are tolerated, expected, and get results. Girls, on the other hand, are typically encouraged to be pleasant, passive, dependent, gentle, neat, and obedient.

Conventional sex role differences appear to lead directly to the following two hypotheses: Because girls are pleasant and passive, some girls who have exceptional educational needs are not identified. Boys, more than girls, find school to be stressful and often respond to it by acting out and are noticed and referred more than girls.

The theory of differential conventional sex roles, as contributors to the conflicts which boys experience in the elementary grades, was put forward quite well by Kedar-Voivodas (1983). In her theory, the school's agenda and expectations, especially at the elementary level, are in line with the conventional female sex role but not with the conventional male sex role. Only the "active learner" role, which is more likely to be encouraged at the secondary level, is in line with the male sex role, if that role is sublimated (that is, re-oriented) toward academic pursuits.

Elementary level boys have only two options—to bow to the authority of the teacher or to reject that authority. While Kedar-Voivodas did not say it, most girls in the elementary grades may have no option but to bow to teacher authority. A boy's rejection of teacher authority may be manifested by silent indifference (non-response) or by active disruption, defiance, and aggression. This often leads to teacher referral for special education, although some of the boys who are referred have no ED or LD condition.

The rich multicultural nature of our society contributes to a wide variety of child rearing practices, early life experiences, and male and female sex roles. Thus, the term "conventional" male or female sex role is a generalization which has some explanatory usefulness, but ignores the individual differences that exist among boys and among girls. Not all boys reject school and the teacher's authority and not all girls accept it.

Before ending our consideration of causal factors that reside chiefly within children themselves, several general points should be made. First, the evidence and theories presented in this report were, for the most part, based on large-sample research, rather than on individual case histories. As a result, the factors found to be salient may not apply very well to a specific child, although they may apply to many children. Further, these factors were considered separately from each other, while they actually operate in combination. Finally, while it is quite possible that these child-centered factors (particularly those based in biological differences between genders) do contribute to actual differences in the incidence of ED and LD, it is also quite possible that they contribute to errors in identification, referral, and M-Team decisions. The factors which follow lie within the purview of teachers and educational authorities at various levels and, as such, reflect various sources of procedural error which are amenable to correction.

Female teachers notice and are alarmed by boys' behavior more than girls' behavior. Male teachers are no more alarmed by boys' behavior than by girls' behavior.

None of the studies that were reviewed dealt with the emotional reactions of teachers, whether female or male, to the aggressive or disruptive behaviors of boys. Obviously, the aggressive behaviors of a six-year old boy would be less of a physical threat to the teacher than a threat to classroom management by the teacher or, perhaps, to the safety of other children. Aggressive behaviors of junior high school boys could be a physical threat to the teacher, and, presumably, more to a female teacher than a male teacher.

Results of studies which compared the referral and class management activities of female and male teachers were mixed. McIntrye (1988) found that a greater proportion of female elementary teachers (72 percent) had made one or more referrals during the

school year than had males (48 percent); the difference occurred primarily in severe cases. In sharp contrast, Gregory (1977), using fictitious cases, found that male teachers, more than females, referred "boys" more than "girls" when aggressive behavior was involved. Further evidence against this hypothesis was given by Good, Sikes, and Brophy (1973) who found that female teachers were more tolerant of misbehavior and treated boys and girls more even-handedly than did male teachers. West (1978) found no differences in the numbers of referrals actually made by female and male teachers. Perhaps the differences in findings are due to the ages of the children or the procedures used (actual versus fictitious cases).

Boys misbehave in the presence of female teachers but not in the presence of male teachers.

No studies addressed this particular issue.

Certain teachers, by their actions, elicit maladaptive behavior by boys, but not by girls.

The possibility of teacher actions contributing to or enabling maladaptive behavior was raised by Ysseldyke et al. (1982). They noted that teachers seldom considered the possibility that their own actions or other classroom variables might have precipitated misbehavior or academic difficulties. Instead, teachers attributed the causes of such problems to conditions in the child's home or to stable, inherent characteristics of the child.

The disparities are due to certain teachers (those who make the most referrals) referring many more boys than girls.

While there is some evidence that teachers do vary in regard to the number of referrals made during a particular span of time, no study focused on this particular issue.

The disparities are due to flaws or weaknesses in the identification criteria, procedures, or tests used.

The key variables (children's personality or behavior characteristics) used for identification are more relevant to boys than to girls.

The key variables that are actually used by some classroom teachers for identification and referral depart, more or less, from the variables set forth in states' descriptions of what constitutes an impairment, particularly in ED. Teachers can be influenced by irrelevant student characteristics (Algozzine, Schmit, and Mercer (1981). Furthermore, teachers' reasons for referral are general and subjective (Ysseldyke et al. 1982.

In the area of learning disabilities, there may be a mismatch between the female dyslexic's problems and definitions used to characterize learning disabilities which Vogel (1990) attributed to a lack of research on girls with learning disorders. Further, while many girls appear to have problems in math, there are very few remedial math programs available to them (National Information Center for Children and Youth with Handicaps, 1990). This may cause teachers to disregard girls with math problems as potential candidates for referral.

Shaywitz et al. (1990) implied that the signs which classroom teachers should use for preliminary identification of children with reading disabilities (but too often do not use) are: problems in attention, fine motor skills, language, and achievement.

Finally, a state's definitions and procedures for identification may have a considerable influence on the male to female ratios of its ED enrollments, as Knitzer, Steinberg, and Fleish (1990) and Wright, Pillard, and Cleven (1990) concluded. Wright also stated that the lack of federal guidelines and definitions for ED has contributed to the differences in definitions used by state agencies.

Wisconsin's definitions for ED eligibility are relevant to this point: "The handicapping condition of emotional disturbance shall be considered only when behaviors are characterized as severe, chronic, or frequent and are manifested in two or more of the child's social systems, e.g., school, home or community." (PI 11 of Wisconsin Administrative Code). Local M-team members determine what behaviors manifested by each case fit the definitions provided. It may be that these definitions allow boys to be over-identified or girls to be under-identified.

Criterion cut-points on diagnostic measures were established on the basis of some authority's judgement of what was abnormal or maladaptive for males.

Vogels's comments (1990) regarding the scarcity of relevant research on girls' problems are relevant here. No other works dealt specifically with this issue. This is an area where almost any research would be breaking new ground.

The key variables central to identification in these areas are subtle and multiple. This allows more room for personal, subjective factors to enter into referral decisions.

Support for this notion is given by Kratovil and Bailey (1986) in their review of literature. Observers of the same behavior, whether related to potential emotional disturbance or learning disabilities, are often likely to disagree as to whether that behavior reflects exceptional educational needs.

While most of the children with physical impairments or mental retardation are first identified by medical professionals, children with suspected problems in the three areas at issue are identified by teachers, most of whom are not well trained in appropriate identification procedures.

It is clear that most referrals for special education are made by regular education teachers. Harris et al. (1987), surveying school psychologists, found that 57 percent of recent referrals were from teachers. However, neither the level of training in identification and referral nor the actual proficiency of teachers was addressed in the works which were reviewed.

The tests which are used for determining eligibility in these areas are inadequate (a new hypothesis).

Hathaway and Corbett (1981) warned against relying on a single test instrument. Salvia and Ysseldyke (1981) believed that the testing and assessment devices which are used are, at best, marginally technically adequate. No works which were reviewed addressed the adequacy of specific diagnostic instruments.

The situation is complicated by the fact that different districts use a variety of instruments. For example, Clarizio and Phillips (1988) reported that the 12 districts whose learning disabilities data they studied used five different IQ tests and six different reading achievement tests.

Wisconsin recently published an evaluation guide in the area of emotional disturbance (Kellogg and Kaufman, 1990). It lists 48 different published instruments that may be used for decisions about ED conditions. While the important issue of local choice and control is supported, one unfortunate consequence is that inappropriate choices of instruments may be made. Furthermore, the problem of different criteria being used in different districts is not resolved.

Adults (mostly teachers) who make referrals are aware of girls' problems as much as boys' problems, but are more reluctant to refer girls.

They perceive special education programs and services to be more appropriate and crucial for boys (who must be prepared for employment), while most girls only have to be prepared for marriage and having children.

Several of the nine works which specifically cited sex bias or stereotyping as a cause of gender disparity dealt with this issue.

It is suspected that, if and when teachers or parents hold this view, it would be fairly difficult to dissuade them from it. This general view of "the place of women in our society" is in line with the conventional sex role of females. Since there is considerable polarity on this issue, it may be fairly difficult to determine which teachers and parents are on the conventional side, and, thus, the degree to which this view contributes to the gender disparity.

It is plausible that, in a very conservative community, this view of "the place of women in our society" could tend to limit girls' participation in special education programs and other optional programs such as sports, vocational education, alcohol and drug prevention, and others.

They feel that it might be dangerous to refer girls to a special education program (which is made up mostly of disruptive boys).

None of the works that were reviewed touched upon this issue.

They are reluctant to label girls as having these disabilities (this is a new sub-hypothesis).

Knitzer, Steinberg, and Fleish (1990) reported that, in some places, this is an inhibitory factor in the referral of students for suspected emotional disturbance, but they did not report it as being more important in the referral of girls than the referral of boys.

Teachers feel that they and their students would benefit by the absence of certain boys (but not girls) who have suspected exceptional educational needs.

Kedar-Voivodas (1983) noted that teachers need to maintain classroom control and are much more concerned and negative about acting-out and anti-social behavior than withdrawn behavior since it: requires teacher attention, may threaten other children, represents a serious and visible threat to the teacher's authority, and prevents effective instruction. In other studies, teacher nominations of "The child I would be most relieved to have removed from my class" were boys.

They are able to cope with female candidates for referral but have run out of ideas and energy for coping with the males.

None of the works that were reviewed focused on the burn-out or stress implied in this sub-hypothesis. With regard to teachers coping with disruptive behavior prior to referral, Kedar-Voivodas (1983) mentioned the importance of teacher tolerance of boys' misbehavior, as did Ysseldyke et al. (1982).

The study by Geiger and Turiel (1983) suggested that junior high school children go through phases or stages in which they alternatively accept and reject rules and authority. While it can be extremely stressful for a teacher to cope with a student who is in a protracted stage of rejection, there is always the hope that the student will emerge from it. This takes tolerance, acceptance, and patience.

Administrative pressure not to increase the numbers of children in special education programs results in referrals of only the most "severe" cases, most of whom are boys.

The key here is the availability of funds and, consequently, the availability of services for less "severe" cases, whom we assume to include more girls. In the study of the 50 states' prevalence rates and proportions of males in ED, LD, and SL, presented earlier, it was found that states with higher per-capita incomes had clearly higher prevalence rates in the areas of emotional disturbance ($r = .42$) and learning disabilities ($r = .38$). While it is inadvisable to infer causation from correlational data, the possibility does exist that poorer states do not identify as many of the less severe cases (mostly girls) as the wealthier states do because they cannot or will not pay the costs. Similar economic forces may directly influence prevalence rates and indirectly influence male percentages at the local level.

Identification procedures result in roughly equal numbers of boys and girls referred, but the number of boys enrolled is greater than the number of girls, for several reasons.

The review of literature showed that the referrals of boys and girls are greatly unbalanced from the start. Nevertheless, the sub-hypotheses are presented and discussed.

Parents of girls are more likely than parents of boys to refuse the initial referral or to refuse an M-team's positive findings.

Although this may happen, no works that were reviewed investigated this possibility. The recent publication of the National Information Center for Children and Youth with Handicaps (1990) seemed to be addressed to parents who were concerned about and over-protective of their disabled daughters.

M-teams are more likely to determine that girls have no exceptional educational needs (EENs).

No prior works addressed this issue. The possibility of errors in the deliberations of M-teams does exist, including the sort of error described here. Incidentally, an M-Team may determine that a child does have a disability (such as dyslexia or depression) but does not have an EEN because his or her school work is satisfactory. While there may be adequate tests to identify a child's deficits in ED or LD, the decision regarding the existence or non-existence of an EEN is much more subjective. This makes such decisions dependent upon

the good judgement of M-team members and also allows institutional factors, such as finances, to influence the decision. Because girls, particularly at the elementary level and perhaps even those with ED or LD, tend to do reasonably well in their school work, they may be judged to have no EENs.

Parents of girls are more likely than parents of boys to take them out of these special education programs.

No evidence was found on this point.

Girls in these special education programs improve at a higher rate than boys do and return to regular education entirely.

The study of the proportions of males and females enrolled in Wisconsin's ED, LD, and SL programs by student age, was aimed at testing this particular sub-hypothesis. Results indicated greater improvements among females might occur in the area of learning disabilities, but not in the other two areas. Conclusive evidence could not be obtained, since it was not possible to identify and follow the enrollments of individual children.

Regular education teachers are very resistant to having certain boys return from special education programs to the regular classroom.

No works which were reviewed addressed this issue.

The high percentages of males in Wisconsin's ED, LD, and SL programs are due to certain events or conditions that are unique to Wisconsin.

The study of 50 states indicated that Wisconsin's SL and DL male percentages are reasonably in line with these of other states, when demographic characteristics are accounted for. Results for ED are inconclusive since no states' ED male percentages were predicted with demographic characteristics.

Recommendations

The following recommendations are aimed at better understanding the flaws and weakness in the steps that lead to special education eligibility decisions and determining how to prevent or correct those flaws. It is assumed that improving the process will result in fewer decision errors and, thus, yield more balanced numbers of males and females.

There may be biological differences between boys and girls or learned differences due to experiences in infancy and early childhood that contribute to the gender disparities observed. While these factors should be understood and kept in mind, they cannot be changed by public agencies. Consequently, the following recommendations focus on policies and procedures in public education.

For children to benefit fully from their years of schooling, in terms of social, emotional, physical, and academic outcomes, their needs must be accurately identified and appropriately provided. Whether male or female, children with exceptional educational needs must be correctly identified, referred, evaluated, enrolled, and served in special education programs.

The proportions of false negatives (that is, children with EENs who aren't identified, referred, and enrolled) and of false positives (children who do not have EENs, but are enrolled) must be assessed with reasonable precision and, as far as resources will allow, reduced. The false negatives do not receive the services that would benefit them. The false positives are inappropriately labeled, perhaps for life. They receive services which

they do not need and which may be harmful. Their enrollment adds to the costs of special education and can prevent the enrollment of children who do need special education services.

Unfortunately, correct decisions about EENs are not easily made. The line between having and not having an EEN in ED or LD is not as distinct and one-dimensional as in orthopedic, hearing, or vision impairments. Across the entire population of children in Wisconsin, disabilities in ED and LD exist in various gradations of severity and are not simply present or absent. As a result, a number of children could be appropriately classified as having borderline EENs in ED or LD. The observer in a small school district sees only a few cases and the various gradations which exist in the entire population may not be apparent.

Furthermore, there are more complexities in ED and LD than are typically assumed. For example, state and federal child counts group all children with ED together and do the same with LD. Few of the works that were reviewed broke out any sub-categories of ED or LD. In fact, ED may include such different disabilities as: anxiety, bizarre behavior, delusions, depression, lack of contact with reality, manic states, phobias, psychosomatic illnesses, self-punishment, uncontrollable rage and withdrawal. Learning disabilities may involve problems in: concentrating, making comparisons, math, predicting outcomes, reading, applying prior learning to new situations, and writing.

A number of other complexities compound the difficulties which face those who make decisions leading to special education eligibility in ED or LD. First, many of the disabilities in both ED and LD are hidden and not apparent to the observer. Second, there is not always a clear, one-to-one association between a child's disability and its outward signs. Different disabilities may be manifested in similar behaviors and a single disability may be manifested in different ways. Third, a child may have more than one specific disability within either ED or LD or perhaps in other disability areas as well. Finally, children who share the same specific disability differ in their ability to deal with it unaided or differ in the resources available to them outside of school.

Despite these difficulties, a standard is proposed to be worked toward, that each child with one or more specific disabilities in either ED or LD, such as those listed above, be correctly identified with regard to the specific variety (or varieties) involved and its (or their) severity. This standard is to be extended to all children, whether male or female and no matter which school district they live in.

Such a standard is ambitious and implies the expenditure of resources, both human and monetary, in both the near and the distant future. The rationale is not that meeting such a standard will ultimately yield savings to the state or the school district or benefits to society, although those consequences are likely. Such a standard is simply one facet of excellence in education and is no more than what should be expected.

The following comments are aimed at conserving human, monetary, and time resources.

- Considerable information can be obtained by using data that are already available, although the research question being investigated should dictate what data are gathered and not vice versa. Using relevant, available data eliminates the costly steps of developing, validating, revising, and employing new data-gathering instruments and procedures.
- While a rather far-ranging review of the literature was conducted, there is much that was missed. Where prior research exists and helps to answer research questions, the need to gather new data is reduced. Furthermore, the research designs and strategies used by others may be useful. It is recommended that the first phase of each major thrust of subsequent research be a review of relevant literature and that such reviews be used to revise research plans as needed.

- One of the goals of science is certainty. The review of literature netted some data and interpretations that should be verified. Although replication of prior studies would add to the number of specific studies to be done, it would provide some time savings in the planning and development stages. It is recommended that when replication of prior studies is judged to be needed, it be done.
- It is not always necessary to gather new (or existing) data from all Wisconsin teachers or school districts. In fact, it would be wasteful and unwise to do so. Sampling procedures were developed in order to gather representative information inexpensively and with a degree of error that can be quantified. It is recommended that sampling procedures be used whenever information is sought about an entire population and that follow-up of non-respondents be carried out until adequate response rates are obtained.

Specific recommendations for future study.

Gender disparities are, at least in part, consequences of error in identification. It is assumed that by understanding and countering the causes of those errors, gender disparities would also be reduced. For this reason, the focus in the following recommendations will be on reducing errors of identification referral, and eligibility.

- To check on the above assumption, we recommend that a study be done to see if Wisconsin districts which have had relatively low male percentages in ED or in LD over the past five years differ in predictable ways from high male percentage districts on factors that are likely to contribute to identification error.
- The recommendation given above would use school districts as the unit of analysis and would provide information that would help to explain why districts differ on identification error and gender disparities. It leaves out differences within districts, which are assumed to be chiefly due to individual differences among regular education teachers. The DPI recommends that one or more studies be done to find out (or verify earlier findings regarding) what teacher characteristics are associated with identification accuracy and identification error.
- It would be worthwhile to know how, where, why, and to what degree the criteria actually used by classroom teachers in their referral and non-referral decisions depart from those set forth by the state of Wisconsin. If the state's criteria are appropriate, they ought to be universally and correctly used. It is necessary to identify any difficulties in the use of those criteria. The DPI recommends that a study be carried out to assess departures from the state's criteria.
- An effort should be made to identify and understand the specific problems in ED and LD that are experienced by females more than males. As Vogel (1990) noted, there is a lack of research on girls with learning disorders. This might apply to ED as well. It is necessary to find out what the consequences of not identifying and treating such disorders are, in terms of girls' future academic, career, social, and emotional well-being.
- Tests are used in the identification and assessment of children with suspected disabilities in both ED and LD. A study should be done to find out what tests are used in Wisconsin schools for these purposes, how those tests are used, and what the independently-judged technical adequacy of each test is. The DPI would like to know, for example, if the tests used include sub-scores on disabilities that are more typical of girls than of boys and whether those tests provide sufficient precision to distinguish severe cases from borderline cases.
- Little study has been done of the M-Team process, although it is a crucial step in special education. The two studies by Ysseldyke and his colleagues have cast some doubt on the quality of decisions made by M-Teams, or at least on the procedures leading to their decisions. It is recommended that one or more studies be done of M-Team procedures and decisions. Since the results of the two Ysseldyke studies were so unexpected and distressing, it would be useful to replicate them, in whole or with appropriate revisions, to see whether the same results apply generally to Wisconsin's M-Team procedures and decisions, and what factors influence the quality of M-Team procedures and decisions.

- Eventually, it will be possible to suggest the field trial of a number of interventions aimed at reducing identification, referral, evaluation, and eligibility errors. The state is not in a good position to do so now. When field trials are carried out, we recommend, first, that some assessment of the costs (both human and monetary) of such interventions be made and, second, that economic and fruitful research designs, such as the factorial assignment of districts or schools to different treatment conditions, be used.

These recommendations for specific studies, if implemented, should allow a number of significant, yet prudent, steps to be taken toward the improvement of special education in Wisconsin. It is likely that this particular list of recommendations will be revised, augmented, elaborated upon, or pruned to manageable size by other stake-holders and participants in this venture. That is as it should be.

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